APPENDIX C

OMWD Comprehensive Potable and Recycled Water Master Plan

OLIVENHAIN

Municipal Water District

Update of Potable and Recycled Water Master Plan Capital Improvement Program

March 2011

AECOM

AECOM

Prepared for:
Olivenhain Municipal Water District
Encinitas, CA

Prepared by:
AECOM
San Diego, CA
60187822
March 2011

Update of Potable and Recycled Water Master Plan Capital Spending Program

Olivenhain Municipal Water District

REGISTERED PROFESSIONAL ENG.
Donald L. MacFarlane
No. 33285
CIVIL
STATE OF CALIFORNIA

Prepared By Don MacFarlane, PE
License No. 33285
Expires June 30, 2012

Greg Keppler, PE
Uday Khambhammettu

Reviewed By Anders Egense, PE
License No. 40654
Expires March 31, 2011

Contents

List of Appendices

List of Tables

List of Figures

List of Acronyms and Abbreviations

AAD	Average annual day
AC	Asbestos cement
AF	Acre-feet
CA	Condition Assessment
CDFG	California Department of Fish and Game
CIP	Capital Improvement Program
CSP	Capital Spending Program
District	Olivenhain Municipal Water District
EDU	Equivalent dwelling unit
FPA	Flavor profile analysis
gpd	Gallons per day
gpm	Gallons per minute
GIS	Geographical information system
HDD	Horizontal directional drilling
HGL	Hydraulic grade line
ICCP	Impressed current cathodic protection
MFL	Magnetic flux leakage
MG	Million gallons
MGD	Million gallons per day
O&M	Operation and maintenance
PRS	Pressure-reducing station
PRV	Pressure-reducing valve
PVC	Polyvinyl chloride
psi	Pounds per square inch
RO	Reverse osmosis
SANDAG	San Diego Association of Governments
SCC	Steel cylinder concrete
SDWD	San Dieguito Water District
THM	Trihalomethane
TM	Technical memorandum
TOC	Total organic compound
UV	Ultraviolet

Executive Summary

The Olivenhain Municipal Water District (District) completed a comprehensive Potable Water Master Plan and Capital Improvement Program (CIP) in 2000 and updated it in 2006. The goal of this 2010 update is to further refine the CIP and estimate current and future development, population, and potable water demands. These are key ingredients of the District's capacity fees which are being updated concurrently. This master plan report demonstrates that the goal has been met. The most significant conclusions include:

1. **Growth.** Based on analyses by the San Diego Association of Governments (SANDAG), the District will continue to grow through 2035, although at a much slower pace than between 2000 and 2010. The estimate of total dwelling units in the District at ultimate development has been lowered because of changes in development plans for 4S Ranch and two large parcels that were planned for residential development that will now be set aside as undeveloped lands for environmental mitigation. These changes will cause an increase in capacity fees which are generally calculated as the cost of the CIP divided by dwelling units.

2. **Potable Water Demands**. Total potable water demands are anticipated to increase, but the District is proposing to implement additional recycled water facilities and conservation so that the per capita (per person) use will be reduced by 20 percent by the year 2020. This is a requirement of State of California Senate Bill SBx7-7 and will be addressed in detail in the District's Urban Water Management Plan to be published in mid-2011. After implementing a Drought Response Level 2 condition in 2009/2010, District customers reduced their water use in excess of 20 percent over the previous year's demands.

3. **Previous CIP.** The District has made significant progress on the projects in its 2006 CIP.

4. **Current CIP**. The current CIP includes the new facilities and the rehabilitation and replacement projects necessary to maintain reliable service to District customers. In developing the CIP, District staff and consultants were focused on necessity and cost-effectiveness to control spending and minimize the impacts on fees and rates. Cost estimates were reviewed and, if necessary, revised to reflect current conditions. The CIP will be funded through capacity fees and water rates, depending on the specific purpose of the project. The draft Water Capacity Fee Update shows an increase in capacity fees of between 6.7 and 13.5 percent for the five zones of benefit in the District. A public hearing regarding the proposed fees is scheduled for March 9, 2011.

The remainder of this executive summary provides a brief description of the results of several specific studies included in the update.

Estimates of Existing, Future, and Ultimate Equivalent Dwelling Units (EDUs)

An EDU is an average single family dwelling unit in the District served by a ¾-inch meter. Other domestic, commercial, and irrigation customers are assigned an EDU value based on the meter size required for their development. Existing, future, and ultimate EDUs are estimated to be 27,405, 4,200, and 31,605, respectively. The estimate of existing EDUs came from District meter records, while the future EDUs were estimated from water system analysis, Assessment District 96-1 data, and District records for large ongoing developments. Ultimate EDUs are the sum of existing and future. The future and ultimate EDUs have decreased approximately 1,830 since the last estimate in 2006.

Updated Potable Water Demand Projections

Typical unit demands in gallons per day per EDU were calculated from District monthly water use records for 2006 through 2008, and also 2009. The calculated unit demands for 2006 through 2008 were comparable to those for 2000 through 2005, but the unit demands for 2009 were significantly lower as the District had declared a Drought Response Level 2 condition. Combining these unit demands with the EDU projections described previously, potable water demands were calculated based on both 2006 through 2008 unit demands, and also the lower 2009 unit demands. Ultimate average annual demands in the District are estimated at between 21 and 26 million gallons per day (MGD).

Draft Revised Capital Spending Plan

The District maintains a list of the capital projects they intend to proceed with in the next 10 years known as the Capital Spending Plan (CSP). Most of the projects in the current CSP, which starts in 2010/2011, were left unchanged. The Plan was updated by deleting projects no longer needed, adding new projects and revised estimates provided by the District, adding projects from the 2006 Master Plan that had not yet been completed, and adding the specific projects described below. The draft updated Plan follows this executive summary, is organized by the type of project, and contains notes on the source/basis of each project. Overall, the Spending Plan is lower in 2010/ 2011 but higher in subsequent years. This CSP will be used in the calculation of capacity fees and is subject to revision/prioritization by District staff and Board of Directors.

Condition Assessment Program

The District is interested in completing a Condition Assessment (CA) Program for their pipelines to develop the data needed to prioritize and schedule pipeline replacements and maintain a reliable transmission and distribution system. It is expected that this program will result in reducing and/or deferring pipeline replacement projects described in the 2006 Master Plan. The program will consist of a review of District records, soil corrosivity testing, and inspection/ nondestructive testing of pipelines. The program is set up in a phased fashion where the District can complete a pilot program for $160,000, review the results, and decide on the program for subsequent years.

In advance of the CA Program, a new project to parallel a steel pipeline in Mt. Israel Road has been added to the updated CSP for $305,000 because the support for the existing pipeline is in poor condition.

Cathodic Protection Systems

Cathodic protection of metallic facilities reduces deterioration from corrosion. The District maintains cathodic protection on its steel pipelines and meters. The District's cathodic protection programs and planned expenditures were reviewed and found to be adequate except for the replacement of deep well anodes. The District's cathodic protection consultant has recommended that three deep well anodes be replaced in the first two years, two to be replaced in the next two years, and one per year for the following six years. Over the 10 years, this is more than double the expenditures in the current CSP.

Proposed Conversion of the Wanket Tank from Potable to Recycled Water Use

The District is interested in developing storage for its Northwest Quadrant Recycled Water distribution system. One concept is to convert the existing 3-million-gallon (MG) Wanket Tank from the potable to the recycled system. AECOM estimated that the conversion could cost $900,000 and is recommending additional hydraulic analyses before proceeding with conversion. The CSP contains the $900,000 figure until further work is completed.

Proposed Demolition of the Palms I and II Tanks

The Palms I and II tanks are located in the southern part of the District in the San Dieguito River Valley. The tanks are relatively small (0.6 and 1.2 MG) and are in need of an expensive rehabilitation. The District staff has proposed removing the tanks and replacing them with storage located in the 6.5 MG Gano Tank. Hydraulic analyses show that removing the tanks and replacing them with a pressure-reducing station preserves the current level of fire protection. Storage analyses indicated that the District's criteria are very close to being met with the Gano Tank and the District has Connection Number 2 to the Water Authority's Aqueduct which can be used to provide additional supply. Removal of the tanks is estimated to cost up to $660,000 including a redundant pressure reducing station, but not including the value of the land if sold.

Northwest Quadrant Recycled Water Extension

AECOM is conducting a separate study of extending the Northwest Quadrant Recycled Water System into Village Park. The preliminary results indicate that such an extension would be very expensive for the amount of water delivered. The District's current CSP contains an estimate of $5,000,000 for this extension and pending a revision of the study, this figure has been left unchanged in the updated CSP.

San Elijo Brackish Groundwater Desalination Project

The District is planning a local water supply project in the San Elijo Lagoon consisting of a well field to extract groundwater, and a desalination water treatment plant to produce potable water. Based on a series of technical memorandums prepared by a consulting engineer, $15 million has been included in the updated CSP. For one of the two alternative well sites, there appear to be less costly pipeline alternatives available.

ES-1 OLIVENHAIN MUNICIPAL WATER DISTRICT
10 - YEAR CAPITAL SPENDING PLAN - 2010 UPDATE
FUND: WATER - CAPITAL IMPROVEMENT FUND

Key	Description	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20
	Pipeline Replacement and Rehabilitation										
4	Condition Assessment Program (2010$)		160,000	400,000	400,000	400,000	400,000	240,000			
1	Encinitas Boulevard Pipeline Replacement	100,000	1,735,000	2,193,000							
1	Pipeline Replacement - Blue Heron Drive	150,000							1,237,000		
1	Steel Pipes Replacement		1,920,000	1,763,000	2,975,000	1,940,000	2,033,000	2,531,000	2,632,000	2,737,000	2,847,000
1	9th Street (#11) Replacement						277,000				
1	Rancho Santa Fe Road Pipeline (#15) Replacement							1,265,000	1,742,000		
1	El Camino Real Pipeline (#'s 19 A & B) Replacement							1,737,000	1,316,000		
1	Lone Jack Road Pipeline (#17) Replacement								1,237,000		
4	Mt. Israel Road 10" Pipeline (2010$)		305,000								
	Cathodic Protection System										
1	Cathodic Test Station Replacement	25,000	26,000	27,000	28,000	29,000	30,000	32,000	33,000	34,000	36,000
5	Replacement of Deep Well Anodes (2010$)	33,000	117,000	150,000	150,000	100,000	100,000	50,000	50,000	50,000	50,000
1	Meter Anode Replacement	100,000	150,000	75,000							
1	ICCP System Maintenance Program								66,000	68,000	
1	Harris Ranch CP/PR Station/Easements	40,000	73,000								
	Facility Retirement Projects										
1,4	Palms I/II Reservoir Demolition + Facilities (2010$)		60,000	600,000							
	Water Supply Projects										
1	Brackish Desalination Feasibility Analysis	100,000									
2	Implementation of Brackish Groundwater Desalination		500,000	500,000	5,000,000	9,000,000					
1	Poseidon Desal Project	17,000									
	Security Projects										
1	Security Installations for District Facilities	20,000	28,000								
	Other Replacement and Rehabilitation Programs										
1	Regulator Replacements	23,000									
1	Pump and Motor Replacement	50,000	52,000	54,000	56,000	58,000	61,000	63,000	66,000	68,000	71,000
1	Valve Replacement	200,000	208,000	216,000	225,000	175,000	182,000	253,000	263,000	274,000	285,000
1	Replace Gaty Valves & Housing	450,000									
3	Gaty 1 Decommissioning						1,000,000				
1	Maryloyd Pump Station Replacement		104,000	379,000							
1	Reservoir Rehabilitation Program	983,000	983,000								
	SCADA Projects										
1	Relocate Radio Repeater at Berk Tank	27,000									
1	SCADA Improvements	50,000									
	Mitigation Projects										
1	Gano/Unit X Mitigation Parcel	40,000									
1	Unit G-1 Pipeline Mitigation	47,000									
	Finance/ Bill Paying										
1	Financial Mgmt. System Evaluation	40,000									
2	Financial Mgmt. System Upgrades	200,000	1,000,000	800,000							
1	Electronic Bill Presentment Program (EBPP)	50,000									
	Meter Projects										

ES-1 OLIVENHAIN MUNICIPAL WATER DISTRICT
10 - YEAR CAPITAL SPENDING PLAN - 2010 UPDATE
FUND: WATER - CAPITAL IMPROVEMENT FUND

AECOM

Key	Description	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20
1	Feasibility Study - AMR Meter Replacement	50,000									
2	Meter Replacement ($500K/Yr, Inflated)	500,000	520,000	757,000	787,000	819,000	608,000	633,000	658,000	684,000	712,000
2	Fixed Base Reading Equipment		1,200,000	1,200,000	1,200,000	1,200,000	1,200,000				
	Studies										
1	Hydraulic Model Calibration	99,000									
1	Comprehensive Master Plan Update	100,000									
	Pressure Reducing Stations										
1	Del Rey Pressure Reducing Station	155,000	156,000								
1	Esfera Street Pressure Reducing Station				360,000						
	New Pipelines										
1	Looped Pipeline at SDCWA 01 Connection	190,000									
1	Harmony Grove - Via Ambiente Pipeline	390,000									
	McCollom WTP Projects										
2	David McCollom WTP LT2 Improvements	2,000,000	12,000,000	2,384,000							
2	David McCollom WTP LT2 CM and Staff Time	200,000	1,800,000								
1	David McCollom WTP Unit AA Pipeline	10,050,000	2,080,000								
1	WTP 34 MGD Membrane Replacement	200,000	292,000	357,000	539,000	569,000	521,000	119,000	104,000	108,000	112,000
	Buildings and Facilities										
1	Facilities Expansion - Complete Campus										2,987,000
2	Facilities Expansion - Building B		500,000								
1	Facilites Expansion - Southside Ops	2,900,000									
	Totals	19,579,000	25,969,000	11,855,000	11,720,000	14,290,000	6,412,000	6,923,000	9,404,000	4,023,000	7,100,000

1 These costs are carried over from the prior year Capital Spending Plan (CSP)
2 New project from District staff
3 2006 Master Plan
4 New Project from 2010 Master Plan
5 From RF Yeager

ES-1 OLIVENHAIN MUNICIPAL WATER DISTRICT
10 - YEAR CAPITAL SPENDING PLAN (PAY GO) - 2010 UPDATE
FUND: RECYCLED - CAPITAL IMPROVEMENT FUND

Key	Description	FY 10-11	FY 11-12	FY 12-13	FY 13-20
1	Preliminary Analysis - Wanket Conversion	50,000			
3	Wanket Conversion (2010$)		100,000	800,000	0
1	Recycled Feasibility Analysis - Village Park	50,000			
3	Recycled Water System - VP - SB-7		500,000	4,500,000	0
1	Wet Weather Storage Access Road	200,000	34,000		
1	SD Connection #1 - Purchase Capacity	250,000			
2	Recycled Water Quality Improvements		300,000	700,000	0
	Totals	550,000	634,000	5,300,000	0

1 These costs are carried over from the prior year CSP

2 New project from District staff

3 Placeholder, to be updated when Master Plan completed

1.0 Introduction, Background, and Scope of Services

The Olivenhain Municipal Water District (District) prepared potable water master plans in 2000[1] and 2006[2] and plans for recycled water distribution in the Northwest Quadrant of the District in 2004[3] and 2007[4]. The District also prepared a potable water demand forecast in 2006[5] The District now needs to update portions of these plans to reflect current development and demand conditions, adjust for SB 7 requirements to reduce per capita demands by 20 percent in 2020, and revise and update the capital spending program (CSP). This work will support an updated calculation of the District's capacity fees by another consultant.[6]

The scope of services for this master plan and CSP update focuses on several topics and includes:

1. Update the District demand forecast and equivalent dwelling unit (EDU) estimate and prepare the baseline for SB 7 (Chapters 2 and 3).

2. Review the pipeline replacement and rehabilitation methodology, project sequencing, scheduling, and planned expenditures and prepare a recommended condition assessment program (Chapter 4).

3. Review the District's cathodic protection systems and recommend a maintenance/replacement program and expenditures (Chapter 5).

4. Analyze the conversion of the Wanket Tank from potable to recycled storage and the potential retirement of the Palms tankss (Chapters 6 and 7).

5. Review the Northwest Quadrant Recycled Water Planning Study, demands, and capital facilities (Chapter 8).

6. Review the San Elijo Brackish Groundwater Desalination Project for inclusion in the capital improvement program (CIP) (Chapter 9).

7. Prepare draft and final master plan summary reports.

2.0 Updated EDU Estimate

2.1 Introduction and Background

An EDU is an average single family dwelling in the District served by a 3/4-inch meter. Other domestic, commercial, and irrigation users are assigned an EDU value based on the meter size required for their development, as shown in Table 2-1. When a new meter is purchased, an EDU value is assigned and a “capacity fee” assessed based on the number of EDUs. The District enters the value in their meter database. For future developments, EDUs are estimated based upon land use. Existing and future EDUs are summed to find the estimated ultimate EDUs at buildout. The District uses the EDU counts along with the value of their existing system and the cost of future facilities to calculate the capacity fees which are assessed when meters are sold. In this chapter, we present the estimated existing, future, and ultimate EDUs (where the ultimate is the total of the existing and the future).

2.2 Updated EDU Estimate Results

Table 2-2 shows the updated EDUs by pressure zone and zone of benefit, which is used in the capacity fee calculations. The estimate shows 27,405, 4,200, and 31,605 existing, future, and ultimate EDUs. The future and ultimate EDUs have decreased about 1,830 since the 2006 estimate primarily for the reasons listed below. Appendix B provides more details on EDU estimates:

1. The 2000 Master Plan and the 2006 study had identified considerably more residential and commercial units in the 4S SPA and 4S Kelwood than will be constructed. The 2000 and 2006 studies were based on District Water System Analyses and Assessment District AD 96-1 estimates of EDUs. This adjustment lowered the future EDUs by 1,435.

2. Two developments, Cielo del Norte and San Elijo Partnership, have been (or will be) purchased by the county of San Diego for open space and mitigation and therefore will not have the water use and EDUs that were previously planned. This resulted in a reduction of another 409 to the future EDUs.

2.3 EDU Estimation Procedures

An updated forecast of future and ultimate EDUs is needed for both the demand forecast and the capacity fee update. The following procedure was used to estimate EDUs:

1. The District provided water meter records including account number, account start date, assessor’s parcel number, user code, meter size, pressure zone, and monthly water use for 2005 through November 2010.

2. The following meter codes were eliminated from the data because they do not generate regular potable demands or contribute to capacity fees: District Project (DP), Fire Meter (FM), Golf Irrigation (GI), Interconnects (IC), Lift Stations (LS), Recycled Water (RC,RI, RN, RS), Raw Water (RW), Temporary Meters (TM), and Wholesale Water Sales (WH). The total EDUs include those currently assigned to irrigation meters. As these meters are converted to recycled service, the number of existing EDUs will decline. In addition, as the recycled water distribution system expands, the capital asset base and future need for replacement also expands. These factors affect the capacity fee calculations (6).

3. An EDU was assigned to each account based on meter size using the District's standard EDU values shown in Table 2-1 below.

4. The EDUs were then summed by pressure zone to develop the "existing EDUs" in Table 2-2. The District's pressure zones are shown in Figure 2-1.

5. Using the same data, the new meters installed since the end of 2005, and their EDUs were summed. These meters were identified by account start date. These EDUs were subtracted from the future EDUs estimated in the 2006 study to develop the 2010 "future EDUs."

6. The District keeps close records on the future EDUs in several large developments including 4S Ranch, Rancho Cielo, Crosby Estates, and Rancho Santa Fe Lakes. These records were compared to the future EDUs and adjustments were made to better match District records. Details are provided in Appendix B.

Table 2-1 Standard EDU Values for Meter Size

Meter Size (inches)	EDU Factor
5/8	0.7
¾	1.0
1	1.9
1 ½	3.1
2	5.0
2 ½	7.0
3	10.2
4	17.1
6	36.0

One EDU uses approximately 555 gallons per day (gpd) and is served by a 3/4-inch-diameter meter. EDUs are assigned to other meter sizes based upon the theoretical meter capacity at the time this table was developed, many years ago.

Table 2-2 EDU Estimates

Zone of Benefit	Pressure Zone	Existing EDUs	Future EDUs	Ultimate EDUs
A	1	3,735	62	3,797
A	2	7,952	90	8,042
A	3	1,462	244	1,706
A	4	1,023	231	1,254
B	5	1,734	72	1,806
B	6	368	0	368
B	7	1,224	712	1,936
C	8	291	662	953
C	9	2	53	55
C	10	46	34	80
C	11	0	293	293
B	12	485	57	542
B	13	452	23	475
D	14	916	683	1,599
B	15	257	82	339
D	16	309	37	346
D	17	28	88	116
D	18	98	288	386
D	19	438	43	481
D	20	1,400	18	1,418
D	21	796	235	1,031
E	22	4,388	193	4,581
	Totals	27,405	4,200	31,605
A		14,173	627	14,800
B		4,520	946	5,466
C		339	1,042	1,381
D		3,985	1,392	5,377
E		4,388	193	4,581
	Totals	27,405	4,200	31,605

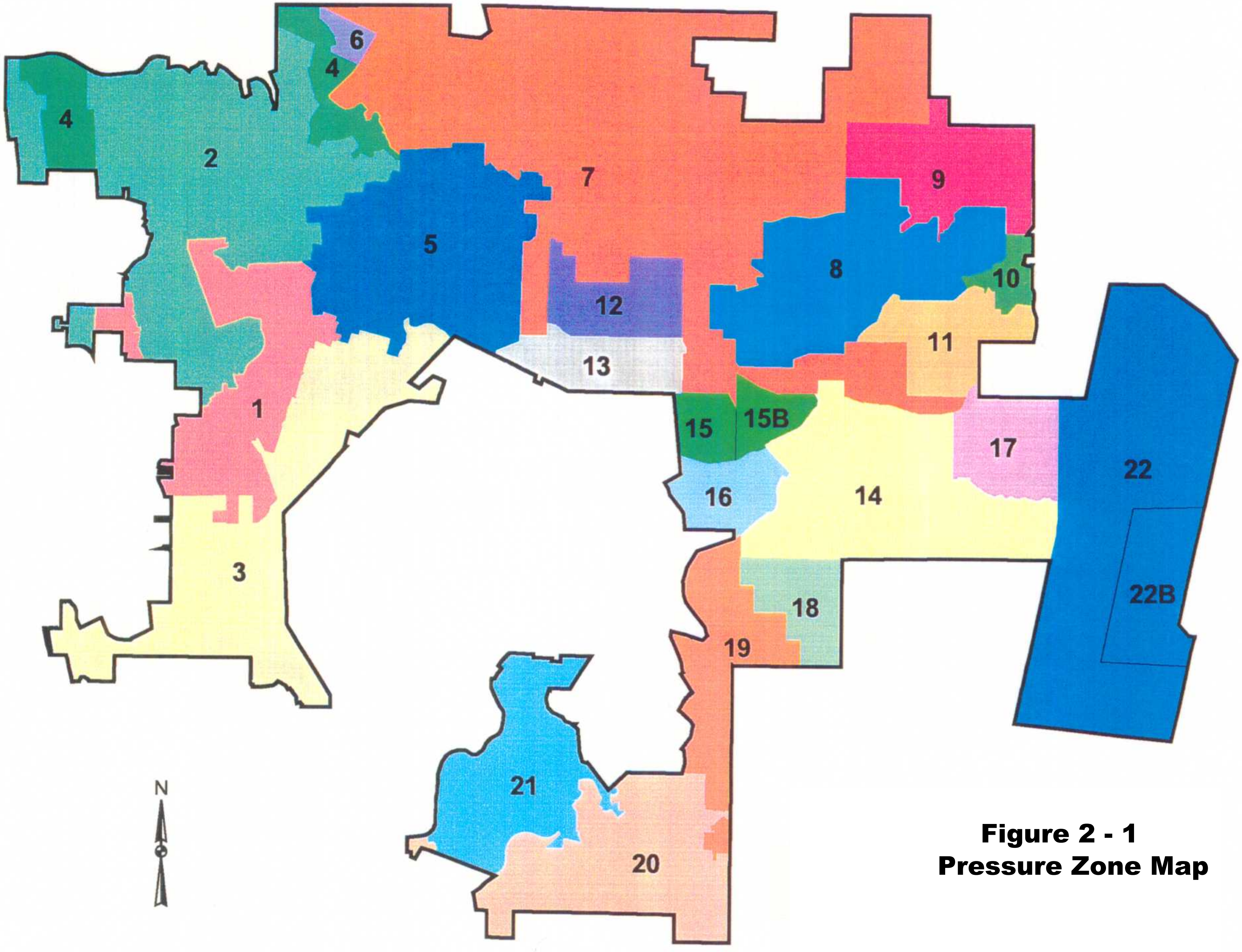


Figure 2 - 1
Pressure Zone Map

3.0 Updated Water Demand Forecast

3.1 Introduction and Background

The District uses forecasts of water demands to plan their infrastructure and revenue. In addition, the State of California Senate Bill 7 requires water districts to reduce per capita demands by 20 percent by the year 2020. By calculating demands under base year conditions, the District can determine how much of a reduction will be necessary and develop strategies to meet the reduction. In this chapter we first calculate typical unit demands in gallons per day per EDU based upon meter records. Combining these factors with the EDU estimates from the previous chapter, we then forecast the future demand with a 20 percent reduction.

In mid-2008, the District declared a Drought Response Level 1 condition including voluntary conservation practices. In mid-2009, the District declared a Drought Response Level 2 with conservation practices. Both of these actions resulted in lower customer demands.

3.2 Existing Potable Water Unit Demand Factors by Pressure Zone

The approach to calculating unit demand factors was similar to that used in the 2000 Master Plan and the 2006 Potable Water Demand Forecast and Peaking Factor Technical Memorandum (TM).

1. The District provided water meter records including account number, account start date, assessor's parcel number, user code, meter size, pressure zone, and monthly water use for 2005 through November 2010.

2. The goal was to develop unit demands for typical customers and so the data for the following special meter codes were eliminated from the data: District Project (DP), Fire Meter (FM), Golf Irrigation (GI), Interconnects (IC), Lift Stations (LS), Recycled Water (RC,RI, RN, RS), Raw Water (RW), Temporary Meters (TM), and Wholesale Water Sales (WH).

3. For the same reason, the top 50 large users were also eliminated from the data.

4. An EDU was assigned to each account based on meter size using the District's standard EDU values shown in Table 2-1.

5. These EDU values were then reduced if the meter had zero monthly water use data because it was installed some time during the year. The reduction was based on District-wide water usage during the missing months as compared to annual use (see Table 3-1). For example, if a meter was installed on May 1, its EDU value was multiplied by 0.80, the sum of the values of May through December.

Table 3-2 summarizes for each pressure zone the weighted EDU total, potable water usage, and the calculated demand factor for years 2006 through 2009 and includes a 4.5 percent increase to address unaccounted-for water based on District records.

3.3 Ultimate Demand Forecast by Pressure Zone

Tables 3-3 and 3-4 present the existing, future, and ultimate demands by pressure zone. Ultimate demands are calculated based on both the 2006-2008 average (pre-allocation) and the 2009 unit demands. It should be noted that these values are lower than total District demand because of the special meters described above that were eliminated. Traditionally, the District has used a maximum day peaking factor of 2.0 times the average annual demand. This appears to be high compared to actual peaks experienced in recent years, as discussed in the next section. However, the 2.0 factor provides a margin of safety in planning facilities to account for uncertainties and changes that may occur, and use of this factor has served the District well over the years. The peaking factor used in other analyses may be lower than that used for facility planning.

3.4 Daily Demands

Daily demands for the years 2004 through August 2010 were collected from the District's Daily System Reports and plotted on Figure 3-2. The shapes of the trend lines are similar with peaks of about 24 to 33 million gallons per day (MGD) occurring in the summer months. These graphs do not show the absolute maximum daily demand but rather a best fit line through the data points. Both 2009 and 2010 to date show a significant reduction in summertime demands with the trend lines peaking at about 24 to 26 MGD, in response to the District's Level 1 and 2 allocation programs. Based on these data, maximum day peaking factors range from 1.50 to 1.84.

3.5 Discussion

As a check, the 2005 EDUs and unit demands were calculated and compared to the same calculations made in the 2006 study. The total EDUs were within one percent, but the EDUs in several zones differed by a few percent. A few zones had significantly different EDU counts, but these were smaller zones with lower water use. The total demand was within 2 percent but, again, there was some variation on an individual zone basis. Most of the unit demands compare very well with just two zones varying by about 15 percent. Between 2006 and 2010, the District changed from parcel-based zone boundaries to hydraulic-based zone boundaries. This moved meters between zones and is believed to be the explanation for the variation mentioned.

In reviewing the average unit demands for the period 2006 through 2008, they are generally lower than 1996-1997, and comparable to 2000-2005. As expected, the unit demands for 2009 are uniformly lower than the period 2006-2008 as the District implemented a Level 1 water allocation in mid-2008 and a Level 2 allocation in mid-2009.

For facility planning, we recommend using the average of 2006 through 2008, to provide a more conservative estimate over current demands. In other applications, like projecting ultimate demands with a 20 percent reduction, 2009 and/or 2010 unit demands may be more appropriate. Zones 8, 9, and 11 cover Rancho Cielo, but only Zone 8 has significant development to date. Because of this, the calculations of unit demands for Zones 9 and 11 were not meaningful. The Zone 8 unit demand has been assumed for Zones 9 and 11.

3.6 SBx 7-7 Calculations

A first draft of the District's baseline demand has been estimated at 358 gallons per capita per day (GPCD). The District's target demand to achieve by the year 2020 is 287 GPCD, 20 percent less than 358.

Figure 3-3 shows population and housing unit history and forecast provided by SANDAG. The estimate of EDU growth has been added to the graph assuming a straight line growth with buildout at 2035. The SANDAG estimates do not provide a buildout date.

Table 3-1 Monthly Distribution of Demands

Month	Percent of Annual Water Use
January	4
February	5
March	5
April	6
May	8
June	10
July	11
August	12
September	13
October	10
November	9
December	7
Annual	100

TABLE 3-2
METER RECORD SUMMARY AND UNIT DEMANDS BY PRESSURE ZONE

PRESSURE ZONE	WEIGHTED EDU BY YEAR & PRESSURE ZONE				WATER USAGE BY YEAR & PRESURE ZONE				UNIT DEMAND FACTOR BY YEAR & PRESSURE ZONE*				DEMAND FACTOR*	
	2006	2007	2008	2009	2006	2007	2008	2009	2006	2007	2008	2009	gpd/ Wt. EDU	Based On
1	3,650	3,654	3,646	3,641	590	638	598	529	463	500	470	416	478	2006-2008 average
2	7,683	7,767	7,800	7,777	1,359	1,469	1,367	1,242	507	541	502	457	517	2006-2008 average
3	1,341	1,339	1,384	1,409	403	444	405	361	860	950	837	733	882	2006-2008 average
4	954	959	959	961	194	214	193	177	583	639	578	526	600	2006-2008 average
5	1,650	1,664	1,675	1,685	682	737	686	623	1,183	1,268	1,173	1,058	1,208	2006-2008 average
6	362	364	362	362	79	90	84	79	627	706	665	624	666	2006-2008 average
7	1,041	1,092	1,100	1,131	360	413	368	338	989	1,083	957	856	1,010	2006-2008 average
8	144	180	202	220	48	76	90	86	945	1,207	1,276	1,123	1,143	2006-2008 average
9	1	1	0	0	0	0	0	0	26	48	20	-	1,143	Equal to Zone 8
10	42	42	41	42	8	9	7	6	522	579	510	425	537	2006-2008 average
11	0	0	0	0	0	0	0	0	-	-	-	-	1,143	Equal to Zone 8
12	330	368	388	400	97	129	138	131	845	1,004	1,016	939	955	2006-2008 average
13	445	447	446	447	247	271	235	215	1,587	1,732	1,504	1,377	1,608	2006-2008 average
14	618	725	800	874	200	245	258	254	928	967	924	833	939	2006-2008 average
15	226	230	237	236	124	138	134	119	1,572	1,712	1,620	1,446	1,635	2006-2008 average
16	294	297	296	296	139	155	131	120	1,354	1,497	1,271	1,160	1,374	2006-2008 average
17	20	19	20	23	6	6	6	7	834	886	824	922	848	2006-2008 average
18	66	67	68	69	29	31	28	24	1,256	1,339	1,156	1,003	1,250	2006-2008 average
19	376	399	419	428	223	253	236	217	1,698	1,818	1,613	1,451	1,709	2006-2008 average
20	1,244	1,273	1,266	1,273	567	649	594	522	1,306	1,459	1,344	1,174	1,370	2006-2008 average
21	724	727	731	738	178	193	193	173	704	762	755	672	740	2006-2008 average
22	3,247	3,710	4,058	4,147	542	653	676	643	478	504	477	444	486	2006-2008 average
Total	**24,458**	**25,324**	**25,898**	**26,159**	**6,075**	**6,812**	**6,427**	**5,867**						

* Unit demand factors include additional 4.5% for unaccounted water.

TABLE 3-3
ULTIMATE AVERAGE ANNUAL DEMANDS BY PRESSURE ZONE BASED ON 2006-2008 AVERAGE

PRESSURE ZONE		AVERAGE EXISTING 2006-2008						FUTURE		ULTIMATE		
		Typical User		Large User		Total						
No.	Demand Factor (gpd/EDU)	EDU	DEMAND (gpm)	EDU	DEMAND (gpm)	EDU	DEMAND (gpm)	EDU	DEMAND (gpm)	EDU	DEMAND (gpm)	INCREASE FROM 2006 DEMAND FORECAST (gpm)
1	478	3,735	1,239	36	44	3,771	1,282	62	21	3,833	1,303	-211
2	517	7,952	2,853	39	35	7,991	2,888	0	0	7,991	2,888	68
3	882	1,462	896	31	41	1,493	937	244	150	1,737	1,087	74
4	600	1,023	426	32	64	1,055	490	231	96	1,286	586	-66
5	1,208	1,734	1,455	5	18	1,739	1,472	72	60	1,811	1,533	111
6	666	368	170	1	2	369	172	222	103	591	275	74
7	1,010	1,224	858	51	110	1,275	968	490	344	1,765	1,312	-685
8	1,143	291	231	2	6	293	237	662	525	955	763	-183
9	1,143	2	2	0	0	2	2	53	42	55	44	-10
10	537	46	17	0	0	46	17	34	13	80	30	-4
11	1,143	0	0	0	0	0	0	293	232	293	232	-55
12	955	485	322	7	7	492	329	0	0	492	329	97
13	1,608	452	505	13	24	465	529	23	26	488	554	12
14	939	916	598	9	36	925	633	683	446	1,608	1,079	-224
15	1,635	257	292	13	37	270	328	82	93	352	422	64
16	1,374	309	295	0	0	309	295	37	35	346	330	9
17	848	28	16	0	0	28	16	88	52	116	68	-24
18	1,250	98	85	0	0	98	85	288	250	386	335	-30
19	1,709	438	520	2	11	440	531	43	51	483	582	-3
20	1,370	1,400	1,332	29	75	1,429	1,406	18	17	1,447	1,423	200
21	740	796	409	17	51	813	460	235	121	1,048	581	29
22	486	4,385	1,480	57	62	4,442	1,542	158	53	4,600	1,595	-819
Total		**27,401**	**14,000**	**344**	**622**	**27,745**	**14,622**	**4,018**	**2,729**	**31,763**	**17,351**	**-1,575**
Total (MGD)			**20.2**		**0.9**		**21.1**		**3.9**		**25.0**	**-2.3**

* Demands include additional 4.5% for unaccounted water.

TABLE 3-4
ULTIMATE AVERAGE ANNUAL DEMANDS BY PRESSURE ZONE BASED ON 2009

PRESSURE ZONE		EXISTING 2009						FUTURE		ULTIMATE		
No.	Demand Factor (gpd/EDU)	Typical User EDU	Typical User DEMAND (gpm)	Large User EDU	Large User DEMAND (gpm)	Total EDU	Total DEMAND (gpm)	EDU	DEMAND (gpm)	EDU	DEMAND (gpm)	INCREASE FROM 2006 DEMAND FORECAST (gpm)
1	416	3,735	1,079	44	33	3,779	1,112	62	18	3,841	1,130	-384
2	457	7,952	2,525	63	50	8,015	2,575	0	0	8,015	2,575	-244
3	733	1,462	744	42	51	1,504	795	244	124	1,748	919	-93
4	526	1,023	374	44	83	1,067	457	231	84	1,298	541	-111
5	1,058	1,734	1,274	3	10	1,737	1,284	72	53	1,809	1,337	-85
6	624	368	160	0	0	368	160	222	96	590	256	55
7	856	1,224	728	81	119	1,305	847	490	291	1,795	1,138	-859
8	1,123	291	227	0	0	291	227	662	516	953	743	-203
9	1,123	2	2	0	0	2	2	53	41	55	43	-11
10	425	46	14	0	0	46	14	34	10	80	24	-10
11	1,123	0	0	0	0	0	0	293	228	293	228	-59
12	939	485	316	10	11	495	327	0	0	495	327	95
13	1,377	452	432	17	35	469	467	23	22	492	489	-53
14	833	916	530	6	20	922	550	683	395	1,605	945	-357
15	1,446	257	258	11	37	268	295	82	82	350	377	20
16	1,160	309	249	0	0	309	249	37	30	346	279	-43
17	922	28	18	0	0	28	18	88	56	116	74	-18
18	1,003	98	68	0	0	98	68	288	201	386	269	-96
19	1,451	438	441	3	11	441	453	43	43	484	496	-90
20	1,174	1,400	1,142	25	69	1,425	1,211	18	15	1,443	1,225	2
21	672	796	372	18	55	814	427	235	110	1,049	536	-15
22	444	4,385	1,351	76	70	4,461	1,421	158	49	4,619	1,470	-944
Total		**27,401**	**12,302**	**445**	**655**	**27,846**	**12,957**	**4,018**	**2,465**	**31,864**	**15,422**	**-3,504**
Total (MGD)			**17.7**		**0.9**		**18.7**		**3.6**		**22.2**	**-5.0**

* Demands include additional 4.5% for unaccounted water.

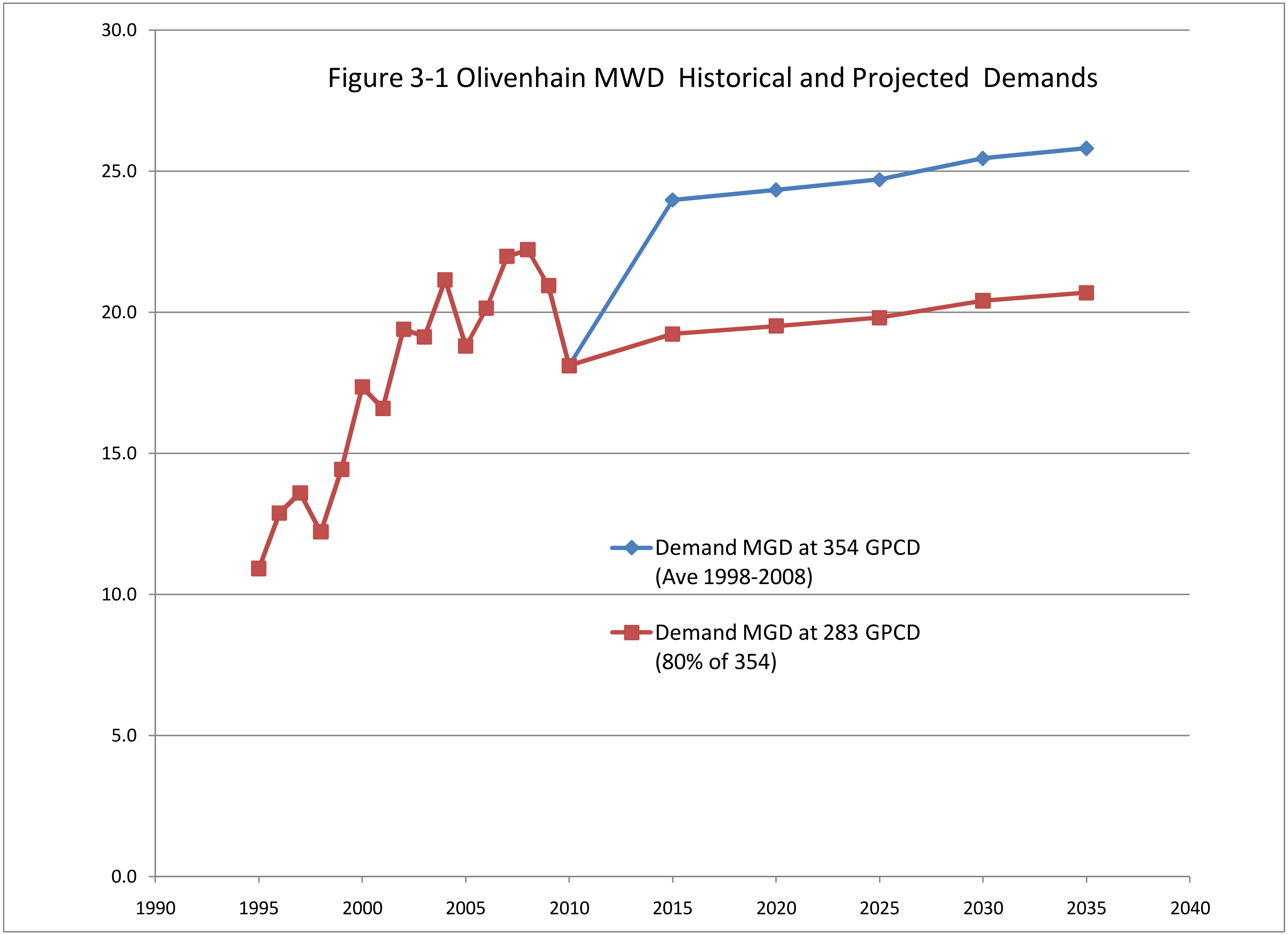
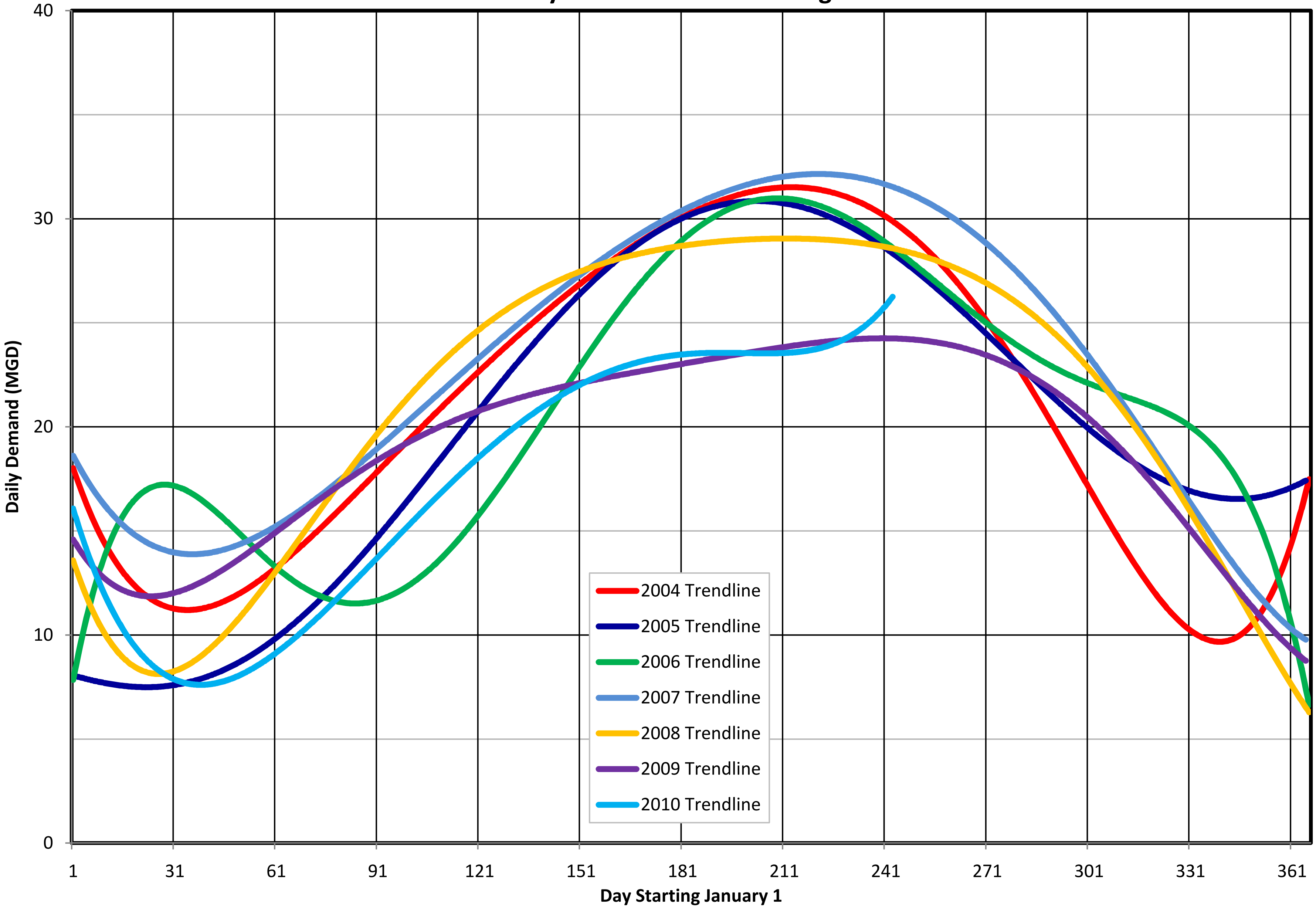
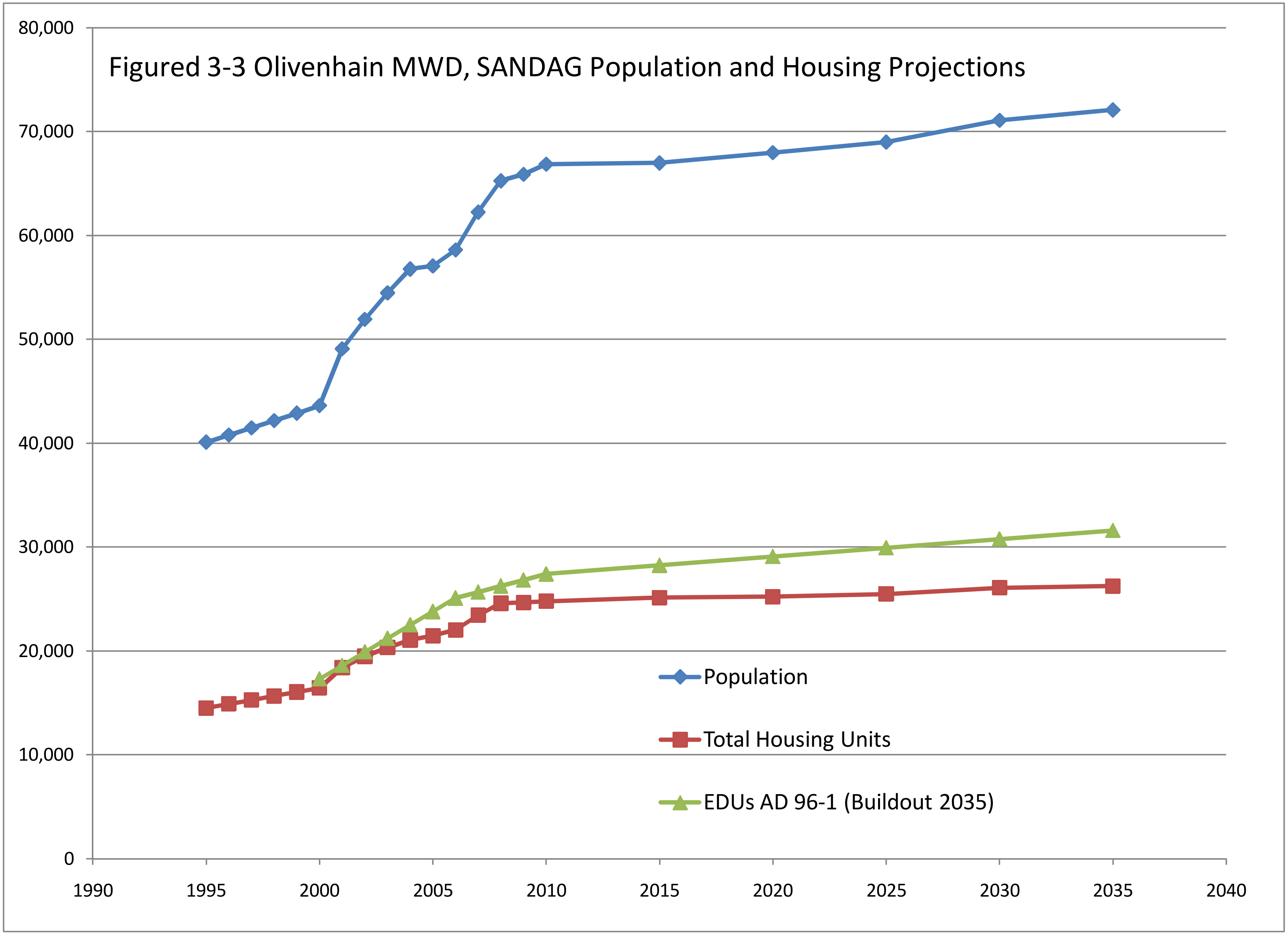


Figure 3-1 Olivenhain MWD Historical and Projected Demands
30.0
25.0
20.0
15.0
10.0
5.0
0.0
1990
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
Demand MGD at 354 GPCD (Ave 1998-2008)
Demand MGD at 283 GPCD (80% of 354)

Figure 3 - 2

OMWD Daily Demands - 2004 to August 2010





Figured 3-3 Olivenhain MWD, SANDAG Population and Housing Projections
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
1990
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
Population
Total Housing Units
EDUs AD 96-1 (Buildout 2035)

4.0 Condition Assessment (CA) Program

4.1 Introduction and Background

Approximately $2 million is currently budgeted annually for replacement and rehabilitation of pipelines and associated appurtenances, including valves. In the 2006 Comprehensive Master Plan, it was suggested that replacement of $141 million worth of pipelines and $13 million worth of valves would be required over the following 50 years to maintain a system with moderate to low risks. This equates to an average annual investment of $3.1 million. Such investments in infrastructure renewal are necessary to avoid the slow deterioration of the system and future financial burdens that could accrue. In total, the District has pipeline infrastructure valued at $256 million in current replacement costs.

Although these funds are currently budgeted, where they should be spent is not clear. Very few repairs of mains have been required during the last few years, indicating that the system is relatively healthy. Industry studies show that repair history is generally the best measure of the structural integrity of a water distribution system. Moreover samples of pipeline materials recently extracted from the system indicate very little discernable deterioration. This record of few repairs is likely the result of both a prudent choice of pipeline materials and a proactive program of protecting the pipelines in the ground. A key component of this proactive program was the installation of cathodic protection for steel and ductile-iron pipelines beginning in 1979. With the installation of cathodic protection, leak repairs and other repairs on steel pipelines have decreased significantly.

In the next section, we provide a preliminary program for the assessment of fittings. A phased approach including an active condition assessment program is recommended, including a method for prioritizing pipelines for assessment. A budget for a pilot program is provided.

4.2 Systematic Program for Replacing Valves and Fittings

Since the installation of cathodic protection on the District's steel pipelines, main line pipe leaks have practically been eliminated. Leaks that do occur are due to failures at fittings, valves, and service connections, mostly resulting from the corrosion of bolts and other metallic parts. The corrosion occurs because of incorrect installation and the presence of groundwater or corrosive soils. AECOM is in the process of checking with other water districts to find out if they have similar problems and how they are being addressed. Moulton Niguel Water District in Orange County reports very similar problems, and they are in the process of developing a prioritization and replacement program. In the meantime, the District should consider recording the following information at every pipeline/fitting excavation:

- Date installed
- District standard specifications or a standalone specification used
- Construction contractor and extent of project
- District's inspector
- Description of failure with pictures
- Protective coating used (if any)
- Presence of groundwater
- Presence of corrosive soils, soil testing

4.3 Phased CA Program

The CA Program will be used to develop the basis for pipeline rehabilitation and replacement projects, priorities, and costs. The current 10-year capital spending plan includes more than $23 million to replace steel pipelines. The CA Program may show that the District's pipelines are in good condition and that some of these expenditures can be eliminated or deferred.

A phased program is recommended with the focus initially on large transmission pipelines, then other transmission pipelines, then large distribution pipelines. Findings from a pilot program will be used to guide development of a larger program.

Program phases are:

1. Desktop study of large transmission pipelines. Review available data and select pipeline(s) for pilot program.

2. Pilot program. Gather additional field data. Develop testing/inspection plan. Perform direct assessment tests. Use data from tests to assess the condition of the pipeline(s).

3. CA Program development. Use experience from pilot program to determine goals, tasks, and budget for five-year, system-wide program, assessing (in the following order):

    a. Other large transmission pipelines
    b. Small transmission pipelines
    c. Large distribution pipelines
    d. Small diameter pipelines

4. CA Program implementation.

Table 4-1 describes the first three phases of the program in greater detail.

Table 4-1 Phased CA Program

Phase	Step, Year	Task Description	Goals
1. Desktop Study of Large Transmission Pipelines (20 inches and larger	Step 1, Year 1	1. Review leak and break data 2. Review pipeline record drawings and specifications 3. Review cathodic protection data 4. Perform site reconnaissance 5. Summarize findings in a TM	1. Select pipeline(s) for pilot condition assessment 2. Develop plan and priorities for obtaining supplemental data (measurement of pipe-to-soil potentials and/or soil corrosivity) 3. Perform general assessment of 33-inch PVC pipeline, based on available records 4. Assess utility congestion, traffic, and other factors affecting consequence of failure
2. Pilot Program	Step 2, Year 1 Acquire Supplemental Data for Selected Transmission Pipeline(s)	1. Measure pipe-to-soil potential and/or soil resistivity in select areas, as guided by the desktop study 2. Determine permit requirements, access requirements, and estimates of cost for pipeline testing program 3. Develop plans and specifications for external direct assessment of pipeline	1. Determine locations on the selected pipeline(s) where potentials for corrosion are highest 2. Develop plans and acquire permits for excavations 3. Procure services for excavation and direct assessment of pipelines
	Step 3, Year 1 Direct Assessment of Selected Transmission Pipelines	1. Excavate pipelines in select areas and perform ultrasonic and other testing to determine metal loss 2. Provide report of findings, including: a. Assessment of pipeline conditions and expected future performance b. Recommendations for additional evaluation c. Recommendations for rehabilitation and replacement	1. Determine the general condition of the tested pipeline(s) 2. Recommend additional testing, possibly including in-pipe NDE methods

Phase	Step, Year	Task Description	Goals
3. CA Program Development	Step 4, Year 2	1. Desktop study of small transmission pipelines[1] 2. Desktop study of large distribution pipelines[2] 3. Desktop study of small distribution pipelines[3] 4. TM	1. Set budget for CA Program for next five years 2. Determine production goals for CA Program for next five years 3. Develop CA Program five-year schedule

[1]Desktop study of small transmission pipelines: follow the same process as Step 1.
[2]Desktop study of large distribution pipelines: (1) performance data review, (2) corrosivity data review, (3) site reconnaissance.
[3]Desktop study of small distribution pipelines: statistical study of performance data and other data.

4.4 Recommended Budget for Phased CA Program

Table 4-2 provides a recommended budget for the CA Program. This budget should be reevaluated annually, based on goals and accomplishments achieved the previous year.

Table 4-2 Recommended Initial Budget for CA Program

Phase		Task Budget	Budget Basis
1. Desktop Study of Large Transmission Pipelines	Step 1, Year 1 Desktop study of transmission pipelines (20 inches and larger)	$40,000	Approximately 250 hours of professional engineering services, plus clerical and incidentals
2. Pilot Program	Step 2, Year 1 Acquire supplemental data for transmission pipelines	$25,000	Approximately 150 hours of technical and professional services
	Step 3, Year 1 Direct assessment of transmission pipelines	$60,000	Three assessment locations and 80 hours of professional engineering services
3. CA Program Development	Step 4, Year 2 Desktop studies of other pipelines. Develop goals, budget, schedule for next five years	$35,000	Approximately 200 hours of professional engineering services, plus clerical and incidentals
	Total	**$160,000**	

4.5 Field Testing of Steel Pipelines

Table 4-3 summarizes the methods that are currently available for field assessment of steel pipelines lined with cement mortar and their applicability to the District's system.

Table 4-3 Methods for Field Verification of Steel Pipe Integrity

Description	Program Step	Comments
Cathodic Protection System Evaluation • Review records of: - Rectifier output - Pipe-to-soil potential - Compare on and instant-off readings - Check maintenance records	Step 1	Primary source of data, to be used to guide other data collection
Pipe-to-Soil Potential Measurements • Measures rates of corrosion • Determines effectiveness of cathodic protection systems • Identifies anomalies	Step 2	To be used to supplement other cathodic protection data to find hot spots, where direct examination will be performed
Electromagnetic Conductivity Survey • Measures soil conductivity using radio signals • Used primarily in rural areas • Inexpensive	Step 2	Applicability to District needs to be determined
Four-Pin Resistivity Tests • Measures soil corrosivity in select locations	Step 2	May be used to supplement pipe-to-soil potentials
Stray-Current Assessment • Field reconnaissance for rectifiers • Research utility owners	Step 2	
Pipeline Current Mapping • Uses electrical fields to find coating anomalies	Step 2	Likely not applicable to District's system
Soil Sampling and Laboratory Testing • Determines resistivity, soluble salts, redox potential, and pH	Step 2	May not be cost effective

Description	Program Step	Comments
External Direct Assessment • Spot excavations in select locations, coupled with various methods to assess material integrity: - Ultrasonic - Guided wave UT - Visual - Coating thickness - Sand-blasting of ductile iron to reveal pits	Step 3	Locations to be selected to optimize potential for problem discovery. Provides a general assessment of condition, but does not necessarily find anomalies.
Remote Field Testing (In-pipe NDE) • Uses electromagnetic field inductance to find pits and other metal loss in iron or steel pipe	Step 3 or future phases	Application to District's system to be determined Could be used for 100% scanning of pipe May require temporary decommissioning Relatively expensive
Controlled Destructive Examination • Pressure testing of pipelines, using existing valves	Step 3 or future phases	Likely not applicable to District's system Performance tests up to 100% of pipe Can find cracks and other defects as well as metal loss Relatively inexpensive
Magnetic-Flux Leakage (MFL) • Uses magnetic fields to find pits and other metal loss in magnetic pipes (iron or steel)	Step 3 or future phases	Application to District's system to be determined Most authorities indicate that MFL is not viable for cement-mortar lined pipe
Closed Circuit Television • Visual examination of pipeline interior	N/A	Not generally recommended for water pipelines as a stand-alone method, but can be coupled with other in-pipe tools

Figure 4-1 shows a remote field testing tool used for the nondestructive examination of a 6-inch ductile-iron pipeline in Malibu, California. In this instance, the tool was effective in detecting over 3,200 corrosion pits and the general thinning of material for 9 miles of pipe. The picture also shows the receiving station, where the tool was extracted from the pipeline. A similar launching station was constructed at the other end of the pipeline. On 4-inch, 6-inch, and 8-inch mains, existing fire hydrants can sometimes be used for launching and receiving the tool. The tool is "free swimming," meaning that it is not tethered. It is pushed through the pipe using a precisely controlled flow of water. On-board batteries power the device and on-board data storage compiles the information. This technology is available for various size pipelines, ranging from 4 to 78 inches in diameter and is applicable to cast-iron, ductile-iron, and steel pipes.

Figure 4-1 Remote Field Testing Device for 6-inch Ductile-Iron or Steel Pipe

5.0 Cathodic Protection System Maintenance and Rehabilitation Program

5.1 Introduction and Background

Since the 1970s, the District has constructed and maintained cathodic protection systems to protect their steel pipelines from corrosion. These systems have been effective in reducing corrosion and leaks and extending the useful life of the pipelines. The scope of work for this task included meeting with District staff and their cathodic protection consultant, R. F. Yeager Engineering (Yeager), to review the systems, their status, planned expenditures, and areas of concern. The District's current 10-year spending plan includes four items:

No.	Description	Funding
1	Cathodic Test Station Replacement	$25,000 in FY 2010-11 increasing by $1,000/year for 10 years
2	Replacement of Deep Well Anodes	$33,000 in FY 2010-11 increasing to $47,000 in FY 2019-20
3	Meter Anode Replacement	$50,000 in FY 2010-11 increasing to $71,000 in FY 2019-20
4	ICCP System Maintenance Program (Rectifier) Replacement	$66,000 in 2017-18 and $68,000 in 2018-19

District staff was comfortable with the planned expenditures except for the replacement of deep well anodes (impressed current anodes) where they felt the expenditures may need to be increased and accelerated. The District has 22 functioning impressed current anodes, two of which are nearly 40 years old while most of the rest are 20 to 30 years old. The life expectancy is in the range of 20 to 30 years. The District is in the process of replacing System 1 which was about 31 years old.

Typically, anode beds deplete slowly over time. As they wear out, a higher driving voltage is required to maintain a given current. This process provides some warning to the District before a complete failure.

5.2 Recommended Program

AECOM staff met with Yeager and reviewed the age and status of the anodes and current replacement costs. Yeager estimates that the cost to replace impressed current anodes is $50,000, in 2010 dollars, including design and installation. Yeager completed a rectifier and anode bed assessment[7], in which they recommended the following anode bed replacement program:

Schedule	ICCP System (Rectifier No.)
5 Years	1, 6, 7, 9, 17, 19, 23, 29 (8 Total)
10 year	3, 4, 5A, 8, 15, 16, 20, 22, 26 (9 Total)
15 Years	5, 10, 13, 21, 28 (5 Total)

This program results in the following 10-year CSP in 2010 dollars. An additional $17,000 was included in FY 2011-12 to provide funds to complete the FY 2010-11 anode replacement, which was only budgeted at $33,000.

Table 5-1 Cathodic Protection CSP

Year	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Budget	$117K	$150K	$150K	$100K	$100K	$50K

Year	2017-18	2018-19	2019-20	2020-21	2021-25
Budget	$50K	$50K	$50K	$50K	$250K

6.0 Conversion of Wanket Tank from Potable to Recycled Storage

6.1 Introduction and Background

The District's 437 Zone potable water facilities include a 3-million-gallon (MG) prestressed concrete tank known as the Wanket Tank that was constructed in 1975. San Dieguito Water District (SDWD) owns one-third of the tank and one-half of the tank site. The tank provides emergency, operational, and fire storage in the far western part of the District. The tank is supplied from the 570 Zone through a 16-inch (high-pressure) pipeline that also supplies a small 570 Zone west of the tank. On the tank inlet is a pressure-sustaining valve that prevents high tank filling rates that would cause a drop in the 570 Zone hydraulic grade line (HGL). A 16-inch (low-pressure) pipeline from the tank supplies the 437 Zone. The District is interested in converting this tank to a recycled water tank that would allow an increased number of customers, provide protection from interruptions in recycled water deliveries, and reduce potable water demands.

Prior to the growth of the 1990s and the development of the Olivenhain Water Storage Program and David C. McCollom Water Treatment Plant (WTP), the District's source of treated water was several connections to the Water Authority's Second Aqueduct. From these connections water was conveyed, mostly through single transmission pipelines, to the west, south, and east sides of the District. Storage tanks like Wanket in the west and Palms in the south were constructed to provide local storage for firefighting and operational peak demands and also for emergencies like disruptions in supply or conveyance. With the Water Storage Program, the District gained not only raw water storage and a treatment plant but also several large treated water storage reservoirs in the central part of the District and parallel transmission pipelines. With centralized storage and redundant transmission capabilities, tanks like Wanket and Palms became less important and, in some cases, were not draining and filling regularly, leading to challenges in maintaining water quality. This chapter discusses the possible conversion of the Wanket Tank from potable to recycled use, and the next chapter discusses the possible decommissioning of the Palms tanks.

The 437 Zone is fed from numerous pressure-reducing stations (PRS) and has access to more regional storage facilities such as the Gaty, Roger Miller, and Denk tanks. The plan is to use the existing 16-inch low-pressure pipeline from the tank to the 437 Zone as the combined inlet/outlet pipeline for recycled water supply. With this scenario, a new potable water PRS from the 570 Zone to the 437 Zone would be constructed north of the intersection of Leucadia Boulevard and El Camino Real. In this chapter, we provide a review of previous studies, an estimate of the costs to convert the tank to recycled, and a review of the District's potable water storage criteria.

6.2 Recommendation

If the Wanket Tank were removed from the potable system, the District's potable storage criteria would still be met on a regional basis. We recommend the District conduct hydraulic analyses of the western portion of the District, Zones 1 through 7, Zone 12, and Zone 13 under a maximum day condition with multiple fires without the Wanket Tank in service and verify that the system can meet the planning criteria. The District should then test redundancy in the system by taking one key pipeline or PRS out of service. While there is no specific criteria to have a fully redundant system, this would provide insight into any system weaknesses. We also recommend additional hydraulic analysis to determine if the addition of a pressure-sustaining feature with the new PRS between the 570 and 437 zones would solve the 570 Zone HGL problems identified in the 2001 Study described below, while also providing adequate supply to the 437 Zone. With the completion of the hydraulic analyses, the District will be in a position to make an informed decision regarding the conversion of Wanket from potable to recycled.

The estimated cost to convert the Wanket Tank from potable to recycled water use is $900,000. A breakdown of the estimate is provided in Appendix A.

6.3 Previous Studies

6.3.1 2001 Hydraulic Analysis

In 2001, Boyle Engineering[8] completed a brief hydraulic analysis of the impacts on the potable system from removing the Wanket Tank and replacing it with a potable water PRS from the 570 Zone. The analysis included the Unit G/N pipeline cross connections but not the Denk Tank inflow/outflow pipelines which have since been completed. The analysis concluded that with the PRS, the pressure in the far western portion of the 570 Zone would drop by about 16 pounds per square inch (psi) and while not desirable, the pressures remain above minimum standards. The memorandum noted that this pressure drop could be reduced by paralleling portions of the high-pressure pipeline. The existing inlet to Wanket Tank includes a pressure-sustaining valve so that the tank cannot fill too fast and draw down the 570 Zone HGL. We recommend additional hydraulic analysis to determine if the addition of a pressure-sustaining feature with the PRS would solve the 570 Zone HGL problems while also providing adequate supply to the 437 Zone.

6.3.2 2010 Valuation and Conversion Study

In August 2010, a report[9] was prepared to estimate the value of the tank, should SDWD sell their share to the District, and the cost of modifying onsite facilities to convert the tank to recycled use. Using three different methods, one-third of the value of the tank was estimated between $209,000 and $576,000. The higher figure, based on a “Refurbishment and Remaining Useful Life Methodology,” was recommended. Pending further analysis and discussion of the tank and site value, these costs have not yet been included in the 10-year CSP. The report estimates the cost of the onsite recycled water conversion improvements at $201,600. AECOM has reviewed these costs and believes they are reasonable but has increased them to $250,000 to make sure the project is not underfunded at this preliminary stage of planning.

6.3.3 2010 Tank Site Appraisal

Also in August 2010, an appraisal[10] was made of the site at $1,830,000. Again, pending further review of the appraisal methodology, analysis, and discussion, these costs have not yet been included in the 10-year CSP.

6.4 District’s Potable Water Storage Criteria

6.4.1 Storage Criteria

The District’s storage criteria as described in the 2000 Master Plan includes:

- Fire Storage. Three hours at the maximum fire flow in the service area. Multiple fires may be considered.

- Local Emergency Storage. One average annual day (AAD) for the service areas the farthest from the Gaty, Peay, Miller, and Denk tanks, the District's main storage tanks. This may be decreased to one-half AAD for areas that are close to the main storage reservoirs.

- Operational Storage. One and one-half AAD in the service area.

6.4.2 Regional Storage

The 2000 Master Plan also evaluated the combination of Zones 1 through 7 and half of Zones 12 and 13, basically the western portion of the District, and the combination of Gaty I and II, Denk, Miller, Wiegand, and Wanket tanks. This evaluation concluded that for ultimate conditions there was adequate storage from a regional perspective.

The conversion of Wanket from potable to recycled does not change this conclusion. However, using the demands shown in Table 3-3 which are based on average demands from 2006 to 2008, should the District retire the Gaty I Tank, it would be about 10 percent short of storage. If demands are more like 2009, Table 3-4, the criteria would be met without Gaty I.

7.0 Potential Retirement of the Palms Tanks

7.1 Introduction and Background

The Palms I and II tanks are located in the southern part of the District, in the San Dieguito River Valley. They provide the storage for the 231 Zone, also known as Zone 21, and have capacities of 0.6 and 1.2 MG, respectively. The 231 Zone is supplied water from the 431 Zone, also known as Zone 20 or the Zorro Zone, which includes the 1.35-MG Zorro II Tank. The 431 Zone is supplied from the 469 Gano Zone (Zone 19) which includes the 6.5-MG Gano Tank. The Palms tanks need a costly rehabilitation, and the District would prefer to demolish them, if adequate storage can be provided by other facilities. In addition, the District could transfer the maintenance contract for the Palms tanks to the 4S II Tank thereby avoiding added maintenance expenses.

7.2 Recommendation

The District's storage criteria were presented in Chapter 6. Considering Zones 19, 20, and 21 together, the District currently meets its storage criteria for ultimate conditions using either the 2006-2008 (Table 3-3) or 2009 (Table 3-4) demands. With the Palms tanks removed, the service area would be about 0.4 MG short using Table 3-3 demands but would meet the criteria with Table 3-4 demands. The District also has the San Diego County Water Authority Aqueduct Connection Number 2 that can be used to reinforce this service area. We recommend the District conduct hydraulic analyses of Zones 19 through 21 under a maximum day condition with multiple fires without the Palms tanks in service and verify that the system can meet the planning criteria. The District should then test redundancy in the system by taking one key pipeline out of service. A redundant PRS is recommended and has been included in the cost estimates. While there is no specific criteria to have a fully redundant system, this would provide insight into any system weaknesses. A 2010 fire flow analysis described in the section below indicates that the hydraulics are no worse when the tanks are replaced with a 12-inch PRS, but there are fire flow deficiencies with and without the tanks.

The cost of demolition and site restoration is estimated to be between $170,000 and $460,000 depending on the cost to handle hazardous materials. $200,000 is estimated for an additional redundant PRS. $660,000 has been placed in the CSP, and a breakdown of the estimate is provided in Appendix A.

7.3 Previous Studies

7.3.1 2006 Hydraulic Analysis

This study[11] evaluated the impacts of removing the Palm I tank under peak hour plus fire flow conditions and starting tank levels at one-half and one-third full. With a 2,500-gpm fire in either the Zorro Zone or the Palms Zone, the Palms II tank nearly emptied. By adjusting PRS settings, this condition was resolved but it is not known if the settings are practical.

7.3.2 2009 Hydraulic Analysis Report

In 2009, a steady-state hydraulic fire flow analysis was completed for the 231 Zone[12]. A base "existing conditions" analysis was completed followed by a series of analyses that removed both Palms tanks from the system and replaced them with one or more PRS connected to the 431 Zone. The report concluded:

1. Two hydrant locations do not meet the fire flow criteria, 1,500 gpm at 20-psi residual pressure under either the existing conditions or the replacement of the tanks with PRVs.

2. When the tanks are replaced with PRVs, two nodes near the Palms tanks do not meet average day demand planning criteria although the pressure change is less than 6 psi at all nodes in the 231 Zone.

3. Overall, the performance of the system can maintain the existing level of service with both Palms tanks out of service.

7.3.3 2010 Palms Tanks PRV Sizing

This study[13] built upon the 2009 Study by increasing the fire flow to 2,500 gpm and determining the pipeline and PRS facilities needed so that hydraulic conditions in the 231 Zone were no worse after removal of the tanks than before. The study recommended a 12-inch PRS and 70 feet of 18-inch pipeline.

8.0 Northwest Quadrant Recycled Water Distribution System

8.1 Introduction and Background

AECOM is currently studying an extension of recycled water into the Village Park area of Encinitas[14]. Two scenarios were investigated:

1. Using only the capacity and pressures available in the existing system to serve new customers.

2. Extension to all customers in the study area.

8.2 Results

The annual volume of recycled water served, capital, water purchase and O&M costs and revenue are shown in the table below.

Item	Scenario 1 Village Park	Scenario 1 El Camino	Scenario 2 Village Park All Customers
Annual Demand (AF)	137	61	365
Capital Costs	$2,642,000	$2,424,000	$8,500,000
Annual Debt Service (30 Years, 4.5%)	$162,000	$149,000	$522,000
Annual Water Purchase ($400/AF) and O&M	$59,400	$29,000	$150,600
Annual Revenue ($1,020/AF)	$139,700	$62,200	$372,300

For all options, the costs exceed the revenues, primarily because of the facilities that need to be constructed. Developers constructed large portions of the existing Northwest Quadrant facilities which made it much more cost effective. Grant funding would make these options much more attractive. The Scenario 1 extension into Village Park using only the capacity in the existing system is the least cost option for the District. The Scenario 1 extension along El Camino is not attractive because of the high cost of facilities and low volume of water delivered. Scenario 2 is very expensive because of the need to construct pipelines all the way to Mahr Tank. Other alternatives would be to incorporate a new feed from the Leucadia County Water District's Gaffner Plant or other sources identified in the regional recycled water study now underway.

8.3 Recommendation

AECOM is currently investigating additional alternatives. Until this work is completed, the cost estimate of $5,000,000 in the current 10-year CSP has been left unchanged.

9.0 San Elijo Brackish Groundwater Desalination Project

9.1 Introduction, Project Description, and Background

The District is planning a brackish groundwater desalination project to provide a reliable 1.0-MGD local water supply for its customers. The supply would come from wells in the vicinity of San Elijo Lagoon, either near Manchester Avenue and I-5 or near La Orilla Road and El Camino Real. A pipeline would deliver the raw water to a reverse osmosis (RO) desalination treatment plant near Manchester Avenue and I-5. The product water would then be delivered to a new reservoir at the treatment plant site or directly into the District's existing potable water distribution system. The brine from the RO membranes would be conveyed through a new pipeline to the San Elijo Joint Powers Authority's (JPA) Water Reclamation Facility or directly to their ocean outfall.

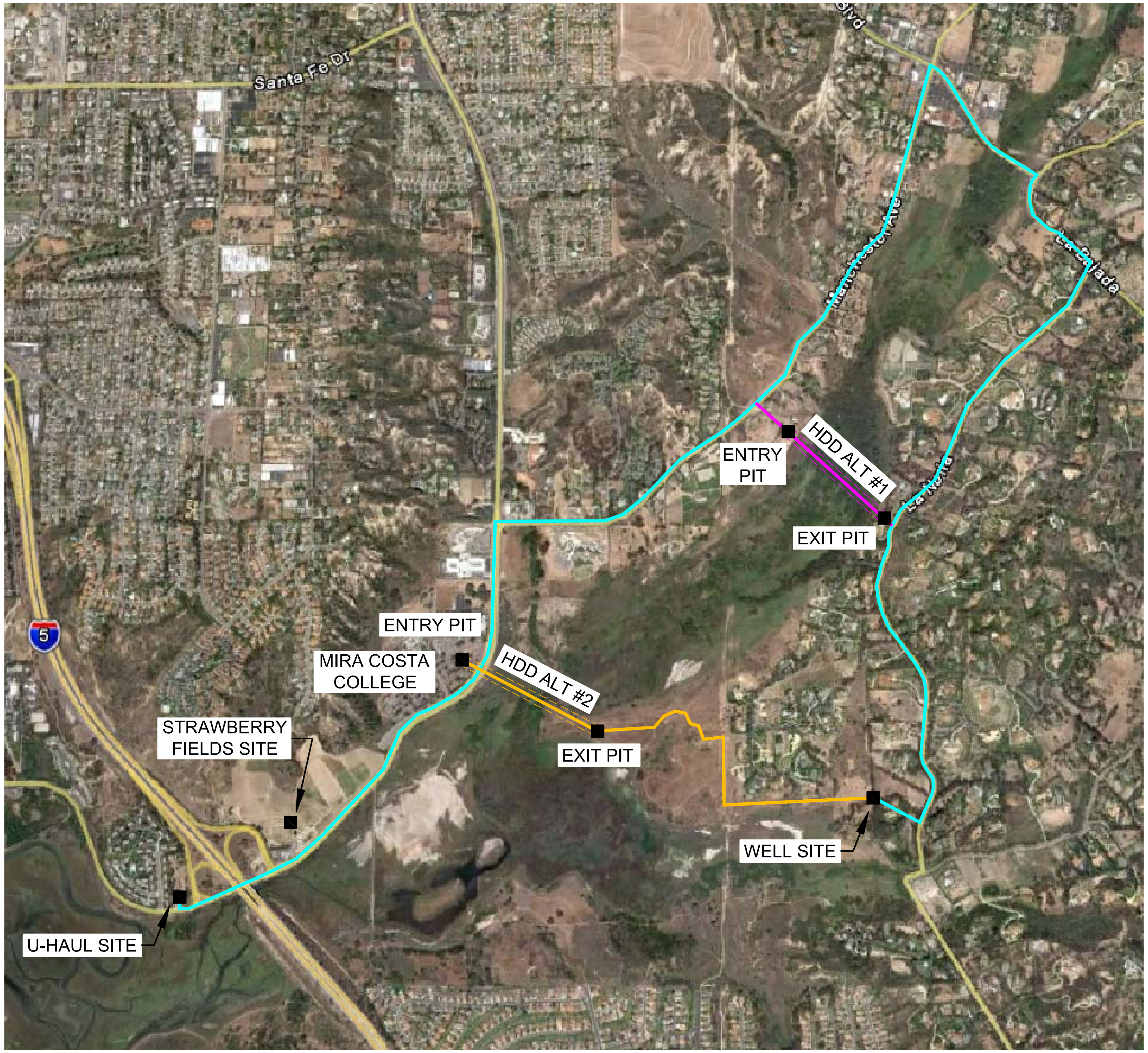
9.2 Capital Cost Estimates for the 10-Year CSP

Preliminary estimates of total project capital costs considering the various well locations and treatment plant sites that have been evaluated range from $14.4 and $20.1 million in 2010 dollars[15,16], not including land acquisition. The higher cost variation alternative includes a nearly 5-mile-long raw water pipeline from the wells, around the lagoon to the treatment plant. The estimates include a 25 percent construction contingency and 25 percent for engineering and administration[17]. The typical accuracy of this level of planning estimate is -30 percent to +50 percent[18]. The District's 10-year CSP includes $15 million for this new water source with the understanding that this budget will be refined once detailed studies are completed to enhance the implementation concepts.

9.3 Raw Water Conveyance Pipelines

TM-4[18] includes a 4.4- to 4.7-mile 12-inch raw water pipeline from the La Orilla well site to the treatment plant sites. The pipeline follows a circuitous route in dedicated public rights-of-way in El Camino Real, La Noria, La Bajada, Rancho Santa Fe Road, and Manchester Avenue. This route avoids open trench construction across the sensitive habitat of Escondido Creek and San Elijo Lagoon, which would be difficult if not impossible to permit. This pipeline crosses Escondido Creek at the La Bajada Bridge where presumably the plan was to attach the pipeline to the bridge. If the bridge crossing is not acceptable to the county of San Diego, a trenchless crossing would be required at this location or some other. The cost of this long pipeline greatly impacts the capital costs and the cost of water for the La Orilla Well Site and leads to the conclusion that an alternative well site near the confluence of Escondido Creek and San Elijo Lagoon would be preferred over the La Orilla Site.

We have given additional consideration to the pipeline alignment from the La Orilla well site. Figure 9-1 shows two shorter alternatives where horizontal directional drilling (HDD) might be used for crossing the lagoon and creek area. By boring under the lagoon and creek, surface disturbance can be avoided, negating potential impacts to biology and water quality. HDD was recently used by the city of Solana Beach and the San Elijo JPA for the replacement of the Solana Beach trunk sewer line across the San Elijo Lagoon and has been utilized in many other locations around the state. In many cases, this has been done in consultation with the California Department of Fish and Game (CDFG) and the Army Corps of Engineers but without the need for actual permits, because impacts to jurisdictional areas are avoided. The length of the bore required for either of these crossings is well within the ability of many HDD contractors.



TM 4 ALTERNATIVE (ROADWAY)
OPEN TRENCH = 25,000'
HDD OR BRIDGE = 800'

HDD ALTERNATIVE #1
OPEN TRENCH = 14,840'
HDD = 1,500'

HDD ALTERNATIVE #2
OPEN TRENCH = 8,920'
HDD = 1,770'

1500' 750' 0 1500' 3000'

SCALE IN FEET

AECOM

OLIVENHAIN MWD
PIPELINE ALTERNATIVES

LA ORILLA WELLS TO
WATER TREATMENT PLANT

FEBRUARY 2011 | FIGURE 9-1

HDD Alternative 2 is laid out to use open cut construction west from the La Orilla Well Site towards Stonebridge Lane and then use HDD to cross the creek/lagoon to Manchester Avenue. While this alignment is conceptual and needs further investigation, it appears it could save the District between $1.0 and $2.0 million in construction costs. This amount is not enough to close the difference in costs between the two well sites in TM-4, but if the La Orilla Well Site is preferred from a hydrogeologic standpoint, or for some other reason, it is a significant reduction in costs.

HDD Alternative 2 also involves the greatest amount of pipeline outside of public rights-of-way and thus may be difficult to permit. Temporary and permanent easements would be needed from multiple property owners. The estimated cost savings are based on very preliminary information and are for comparison and planning purposes only. It is recommended that a more detailed alignment study be performed, taking into consideration geology, traffic, biology, and other site-specific factors. The cost of the easements, in particular, warrants additional investigation.

With HDD, there is a risk of “frac out”—an event where drilling mud (i.e., bentonite) leaks from the bore through fissures in the subgrade and spills onto the ground or into surface waters. With well-written specifications, good knowledge of subsurface conditions, and the prequalification of bidders, the risks of mud spillage can be minimized. Included in the specifications should be the requirement that the contractor develop a frac-out response plan, to mitigate any incident. CDFG and other regulatory agencies will likely raise this issue, but the environmental benefits of well-executed HDD construction are clear.

9.4 Groundwater Water Quality and Treatment Processes

TM-3 and TM-4 address treatment processes and costs. TM-3 includes a detailed breakdown and description of processes and costs, including process flow diagrams, for both surface and groundwater treatment. TM-4 focuses on the San Elijo Basin but includes only summary level information and therefore it is not completely clear which processes are being recommended and how the costs were estimated. In future investigations, the District should develop a more detailed breakdown of the processes and costs in TM-4 as described below.

9.4.1 Source Water Quality and Quantity

The TMs note that the groundwater quality assumed as the basis for selecting treatment processes is actually from the San Dieguito River Basin and that very little groundwater quality data is available for the San Elijo Basin. This means that the processes and costs are subject to revision once the San Elijo groundwater quality is determined and that project feasibility will need to be re-confirmed. As recommended in TM-4, the District should proceed with well drilling and testing to establish water quality and to confirm that the yield available meets the near and long term requirements of the project.

In the “Representative Water Quality Data for the Study Area,” there are several constituents that do not seem reasonable including 1) a turbidity of 144 NTUs (too high for a groundwater source), 2) incompatible dissolved oxygen and redox potential levels, and 3) the existence of significant total organic compound (TOC) levels in the groundwater. It is unusual for groundwater in San Diego County to have high TOCs unless it is under the influence of surface water or contaminated with man-made compounds. Undoubtedly, in planning a brackish groundwater desalination project, the District envisioned that it would not be subject to surface water treatment requirements, including the Long Term 2 Enhanced Surface Water Treatment Rule 2 (LT2). If the project will be under surface water treatment rules, the future investigations will need to address giardia inactivation requirements and contact time in the clear well.

9.4.2 Treatment Goals

The primary treatment goal is to meet regulatory requirements. However, the treatment process should include consideration of the impacts on distribution pipelines from mixing water with different qualities, and of reversing flow direction, as well as taste and odor issues. As a part of the Carlsbad Desalinated Water Conveyance Facilities work, AECOM conducted flavor profile analysis (FPA) with 75 individuals from throughout the county. FPA is a structured and controlled taste testing process designed to identify the threshold where humans notice a difference in the taste of water. For Carlsbad, the participants were testing blends of desalinated seawater and Water Authority treated water. They were able to distinguish between relatively small changes in blends.

TM-4 proposes to add the desalinated brackish groundwater into a dead-end 8-inch distribution pipeline. Because of seasonal variations in demand, some customers would receive 100 percent desalinated groundwater during all seasons, while others a short distance away would vary seasonally from 100 percent desalinated groundwater to 100 percent David C. McCollom WTP water. Water quality would also vary whenever the plant needed to be shut down. While both water qualities would meet all regulations, the District should consider blending or adjustment of the desalinated groundwater finished water quality so that it more closely matches David C. McCollom WTP water quality and avoids customer taste and odor changes and the perception of problems.

9.4.3 Pretreatment Processes

TM-3 discusses coagulation/ membrane filtration to remove TOC and reduce trihalomethane (THM) formation potential. RO membranes are typically very efficient at rejecting TOC which should be sufficient to control THM formation potential. There are situations where adding a coagulant in high-TOC water can significantly improve the performance of a membrane filter and this could be the reason for using coagulation rather than for THM control.

TM-3 also proposes the use of permanganate as a coagulant and states it is not a membrane issue because greensand will absorb it. Greensand will eventually run out of capacity to absorb permanganate, therefore a reducing agent and close monitoring will be needed upstream of the membranes to prevent damage. In addition, the levels of iron in the groundwater may be too high for manganese greensand filtration, such that ultrafiltration or microfiltration may be needed.

Future investigations should address the constituents that could lead to membrane fouling including chlorinated/dechlorinated water, permanganated/depermanganated water, and sparingly soluable salts.

9.4.4 Post Treatment/Disinfection

In TM-3, the treatment processes included a decarbonator, but there is not enough detail in TM -4 to know if these are a part of the process for the San Elijo groundwater. Many RO plants are now avoiding the use of acid by employing advanced scale inhibitors. This can eliminate the need for a decarbonator, as well as the use of a hazardous chemical, sulfuric acid.

More detail is needed on the proposed disinfection strategy, which needs to be compatible with the District's use of chloramines as its distribution system residual disinfectant. If in fact the source wells are under the influence of surface water, a clear well will be needed to achieve disinfection contact time requirements. A clear well would also provide operational flexibility for the plant.

9.4.5 Residuals

Selecting the San Elijo Basin for the project has the advantage of the close proximity to a wastewater treatment plant and ocean outfall for brine disposal. The San Elijo JPA should be contacted to develop a better understanding of the fees and other requirements associated with the use of their facilities, even for the proposed low brine flow rate. The project budget should include the costs for the brine and solid residuals (if any) disposal.

9.4.6 Cost Estimates

While TM-3 had some detailed breakdown in the cost estimates, TM-4 had almost none and was therefore difficult to review. In addition, land costs were not included but there should be data available to estimate and include these costs in the budget. In its next steps, the District should develop additional cost details including:

1. Treatment plant land costs.
2. Facilities and cost to deliver finished water to the distribution system.
3. Connection and processing fees for brine and solids disposal.
4. Power costs, TM-3 shows them to be the same for surface and groundwater with very different TDS levels.
5. The level of contingency used.

9.5 Reliability Benefits and Cost of Water Impacts

This local project will help the District diversify its water supply portfolio and improve reliability. Because the supply is local, it is not subject to reduction from droughts in northern California or the Colorado River Basin, regulatory pumping restrictions, or conveyance infrastructure interruptions. The project will likely be sized to provide a long term safe yield of approximately 1 MGD.

In the late 1990s and early 2000s, the District made a major investment in reliability with the Olivenhain Water Storage Project, including the 34-MGD David C. McCollom WTP. This project provides local storage and treatment so the District can continue deliveries in the event of an interruption on the imported water system.

The potential cost of the new groundwater source water has been described in TM-4. In addition to this cost, as the District incorporates a groundwater supply, it will reduce production from the David C. McCollom WTP by an equal amount, increasing the unit cost of water from this facility. Combined, these represent the cost of a reliable local supply.

References

1. Boyle Engineering Corporation, *Water Master Plan*, Olivenhain Municipal Water District, January 2000.
2. CH2M Hill, *Comprehensive Master Plan*, Olivenhain Municipal Water District, February 2006.
3. Boyle Engineering Corporation, *Northwest Quadrant Recycled Water Analysis*, Olivenhain Municipal Water District, June 2007.
4. Boyle Engineering Corporation, *Northwest Quadrant Recycled Water Study*, Olivenhain Municipal Water District, June 2004.
5. Boyle Engineering Corporation, *Potable Water Demand Forecast and Peaking Factor Technical Memorandum*, September 2006.
6. PBS&J, *Water Capacity Fee Update*, Olivenhain Municipal Water District, Draft February 2011.
7. R. F Yeager Engineering, *OMWD – Rectifier and Anode Bed Assessment*, December 12, 2010.
8. Boyle Engineering Corporation*, Evaluation of Wanket Reservoir Conversion to Northwest Recycled Water System*, Memorandum to George Briest from Anders Egense and Randy Whitmann, July 11, 2001.
9. Dexter Wilson Engineering, Inc., *J. C. Wanket Reservoir Storage Valuation and Conversion Cost Estimate*, SDWD, August 25, 2010.
10. Anderson and Brabant, Inc., *Wanket Tank Site, Quail Gardens Road, Encinitas, CA Summary Appraisal Report*, SDWD, August 26, 2010.
11. Boyle Engineering Corporation, *Memorandum – Evaluation of 0.6 MG Palm Reservoir Removal*, May 12, 2006.
12. Infrastructure Engineering Corporation, *Palms Reservoir Hydraulic Analysis*, July 6, 2009.
13. Infrastructure Engineering Corporation*, Draft Palms Reservoir Pressure Reducing Valve Sizing*, December 8, 2010.
14. AECOM, *Draft Study of Extending Northwest Quadrant Recycled Water to Village Park*, Olivenhain Municipal Water District, December 23, 2010.
15. Carollo Engineers, *Draft Technical Memorandum 1 – Preliminary Water Quality Investigations, Opportunities and Constraints Analysis of the Eastern San Elijo Lagoon/Western Escondido Creek and the San Dieguito Basin Groundwater Basin*, January 2010.
16. Carollo Engineers, *Draft Technical Memorandum 2 – Non-Technical Implementation Issues, Opportunities and Constraints Analysis of the Eastern San Elijo Lagoon/Western Escondido Creek and the San Dieguito Basin Groundwater Basin*, January 2010.
17. Carollo Engineers, *Draft Technical Memorandum 3 – Technical Process Evaluation and Site Selection, Opportunities and Constraints Analysis of the Eastern San Elijo Lagoon/Western Escondido Creek and the San Dieguito Basin Groundwater Basin*, May 2010.
18. Carollo Engineers. *Draft Technical Memorandum No. 4 – Conceptual Sites and Cost Estimates, Opportunities and Constraints Analysis of the Eastern San Elijo Lagoon/Western Escondido Creek and the San Dieguito Basin Groundwater Basin*, October 2010.

Appendix A – Construction Cost Estimates

Appendix A – Construction Cost Estimates

Wanket Tank Conversion Costs

No.	Item	Units	Quantity	Unit Cost	Cost
1	Onsite Costs, Piping and Valve Disconnections and Removals, New Valves and Piping	Ea.	1	$210,000	$210,000
2	New 520 to 437 Potable Aboveground PRV	Ea.	1	$200,000	$170,000
3	Disconnections, Connections, and Pipeline Allowance (16 inches)	Ea.	1	$250,000	$250,000
	Subtotal				**$630,000**
4	Contingency at 20%				$126,000
	Subtotal				**$756,000**
5	Engineering, Geotechnical, Surveying, and CM 20%				$150,000
	Total				**$906,000**

Mt. Israel Pipeline Extension
Opinion of Probable Cost – Planning Level

Item	Description	Qty	Unit	Total Unit Cost[1,2]	Total
1.	10" Welded Steel Pipe	1,400	LF	$140	$196,000
2.	2" Blowoffs	4	EA	$2,000	$8,000
3.	1" Air-Vac Valves	3	EA	$3,000	$9,000
4.	Shut-off/Isolation Valves	2	EA	$3,000	$6,000
	Subtotal				**$219,000**
	Contingency at 20%	1	LS		$43,800
	Subtotal				**$262,800**
	Plans and Specifications and CM at 15%	1	LS		$39,400
	Total				**$302,200**

[1]Unit prices are based on bids received 11-2010 for City of Poway project with similar constraints and conditions.

[2]Pipeline construction assumes steep narrow road with rocky subgrade.

Demolition of Palms Tanks 0.6 and 1.2 MG
Opinion of Probable Cost – Planning Level

Item	Description	Qty	Unit	Total Unit Cost Including O&P[1,2,3,4]	High Total	Low Total	Average Total
1.	Tank 2 (1.2 MG) Demolition[1]	176,471	CF	$0.28	$49,400	$49,400	$49,400
2.	Tank 1 (0.6 MG) Demolition[1]	88,235	CF	$0.28	$24,700	$24,700	$24,700
3.	Steel Salvage[3]	-277	Long Ton	$350.00	$ (97,100)	$ (97,100)	$ (97,100)
4.	Tank 2 (1.2 MG) Hazardous Paint Removal[2]	14,212	SF	$5.65	$80,300	$-	$40,150
5.	Tank 1 (0.6 MG) Hazardous Paint Removal[2]	8,183	SF	$5.65	$46,200	$-	$23,100
6.	Concrete Ring Wall/Footings[2]	457	LF	$15.40	$7,000	$7,000	$7,000
7.	Asphalt Paving	1,156	SY	$7.15	$8,300	$8,300	$8,300
8.	Reservoir Piping (Remove to Property Line)[2]	550	LF	$8.20	$4,500	$4,500	$4,500
9.	Minor Grading/Infill[2]	1,029	CY	$15.00	$15,400	$15,400	$15,400
10.	Removal Drainage Inlets[2]	1	EA	$110.00	$100	$100	$100
11.	Erosion Control[2]	1	LS	$4,300.00	$4,300	$4,300	$4,300
12.	Removal of Vaults	3	EA	$1,500.00	$4,500	$4,500	$4,500
13.	Removal of Masonry Building	1	LS	$3,000.00	$3,000	$3,000	$3,000
14.	Remove Bollards	6	EA	$15.15	$100	$100	$100
15.	Remove Electrical	1	LS	$1,500.00	$1,500	$1,500	$1,500
16.	Remove Chain Link Fencing[2]	900	LF	$3.21	$2,900	$2,900	$2,900

Item	Description	Qty	Unit	Total Unit Cost Including O&P[1,2,3,4]	High Total	Low Total	Average Total
17.	Removal of Bituminous Soil Under Tanks						
	To Hazardous Landfill[2]	620	CY	$240.00	$148,800	$55,800	$102,300
	To Bituminous Concrete Batch Plant[2]	620	CY	$90.00			
18.	Dump Charges For Rubble[4]	450	Ton	$101.00	$45,500	$45,500	$45,500
	Subtotal				**$349,400**	**$129,900**	**$239,650**
	Contingency at 20%	1	LS		$69,900	$26,000	$47,950
	Subtotal				**$419,300**	**$155,900**	**$287,600**
	Plans and Specifications and CM at 10%	1	LS		$41,900	$15,600	$28,800
	Subtotal				**$461,200**	**$171,500**	**$316,400**
	Redundant PRS				**$200,000**		
	Total				**$660,000**		

[1]Overall building volume in cubic feet - estimate based on attached site plan.

[2] 2007 RS Means Data.

[3]http://www.steelmarketupdate.com/pub/blog/posts/2010/10/30/steel-scrap-prices-forecast-to-rise-in-november-affecting-steel-prices/.

[4]Miramar Landfill.

Appendix B – Analysis of the Future EDUs in Large Developments

Appendix B – Analysis of the Future EDUs in Large Developments

The District keeps separate records of progress towards completion for the large developments, as shown below. This data was used as a check on the compilation of future EDUs from the District's meter records, as described in Chapter 2.

Development	Remaining EDUs
Crosby Estates	132.4
Rancho Santa Fe Lakes	478.2
Rancho Cielo	248.9
4S Ranch Residential	157.8

Buildout EDU estimates for the District were based on Assessment District 96-1 data unless there was a water system analysis (WSA) available. For each development, we reviewed this information and then subtracted existing EDUs obtained from the meter records to estimate future EDUs. For Crosby Estates and Rancho Cielo, the estimates matched the District records almost exactly. For Rancho Santa Fe Lakes, the WSA was approximately 20 percent higher (133 EDUs) than the District's records. Therefore, the estimate of future EDUs in Rancho Santa Fe Lakes was revised to match the District records. For 4S Ranch (Zone 22, Zone of Benefit E), there was a major discrepancy between the future EDUs based on WSA and AD 96-1 and meter record data, and District records. We made a detailed analysis of Zone of Benefit E and it is shown in the table on the following page. The conclusion was that there were major differences between the planned (WSAs) and the actual development. The future EDUs were corrected to match the District records.

Olivenhain MWD		**AECOM Water**		**2/17/2011**		
Zone 22, Benefit Zone E EDU Analysis						
					Difference	
	2006	**2010**	**2010**	**2010**	**2006-2010**	
Area	**Ultimate (1)**	**Existing (2)**	**Future (3)**	**Ultimate (4)**	**Ultimate (5)**	**Notes on 2006 Sources**
4S Kelwood N1	1,193	1,320	0	1,320	-127	AD 96-1, 7/ 1998 WSA, 1200 EDUs
4S Kelwood N2	670	580	0	580	90	AD 96-1, 7/ 1998 WSA, 3,104 EDUs N2-N4
4S Kelwood N3 & N4	2,106	1,413	108	1,521	585	AD 91-1, Aug 2001 WSA, 2085.5 EDUs
Subtotal 4S Residential	3,969	3,313	108	3,421	548	
Commercial	840	148	23	171	669	See note below
Subtotal 4S Kelwood	4,809	3,461	131	3,592	1,217	
4S SPA	1,139	927	12	939	200	Existing EDUs + AD96-1 Data
Ralph's Family Place &	68	0	50	50	18	
Ralph's Ranch						
Total Zone 22, Area E	6,016	4,388	193	4,581	1,435	
1 - From 2006 Potable Water Demand Forecast and Peaking Factor Technical Memorandum						
2 - From District Meter Records						
3 - From District Records						
3 - 4S SPA from GoogleEarth, 2 Undeveloped Lots on RB Road and 1 on Thornmint Ct., AD 96-1 EDUs						
3- 4S Neighborhood 1, Unit 30 & 31. Unit 30 graded undeveloped. Unit 31 Temp facilties on NW corner - will be developed in the future.						
The future EDUs are based on 6 acres, 2,500 gpdpa, and 650 gal/EDU (1.17x555, 2000 MP)						
4- Updated 2010 Existing Plus 2010 Future, Slightly Different than December 29, 2010 Draft MP Report						
5 - 2006 values minus 2010 values. Negative indicates an underestimate of EDUs, positive is an overestimate						
2006 4S Kelwood Commercial EDU Estimate - The 2000 Master Plan estimated 3,300 gpm AAD for Zone 22.						
3,022 gpm was estimated for residential use leaving 378 gpm commercial. At 0.45 gpm/EDU, 378 gpm is 840 EDUs						

Appendix C – Olivenhain Municipal Water District Pipe Lengths

Appendix C – Olivenhain Municipal Water District Pipe Lengths

The following table summarizes the length of pipe in the District's Zones of Benefit by material type and diameter.

The District's online GIS database was used to determine the pipe lengths as follows:

1. Access the District's online database.
2. Under the layer's tab, turn on the layer "Water Meter."
3. Go to query tab and under the dropdown menu for layer select "Water Meter" and query by "Pressure Zone." Enter pressure zone "1" and hit "search."
4. Go to the results tab and hit "export data." Select file type as "Excel."
5. Select "uncheck all" and select fields "pressure zone," "material," "pipe size" and "pipe length." Hit "export data" and save the file to your hard disk.
6. Repeat Steps 3 through 5 until you download the data from all pressure zones, including unknown zones.
7. Now combine the data from pressure zones by Benefit Area A through E and unknown pressure zones into MS Excel. Create an individual sheet for each benefit area in the MS Excel spreadsheet.
8. For each benefit area, sort the data by pipe size and pipe material type.
9. Create a summary sheet as shown in the table for all the benefit areas with material and pipe sizes.
10. Write a formula to sum all the pipe lengths for a particular material and pipe size. Repeat this formula for all pipe sizes for a given material.
11. Repeat Step 10 for all the benefit areas.
12. For each benefit area, sum totals by pipe size and by pipe material.
13. To find the location of pipes in the "unknown" pressure zone, repeat Steps 1 through 3. Also turn on the "pressure zone" boundary layer.
14. Go to results tab and click on "zoom to" for every single pipe. The zoom to command will take you to the location of the pipe on the map. Assess visually which pressure zone the pipe belongs to and edit the spreadsheet earlier created for "unknown" pressure zone. Repeat this process for all the pipes in the "unknown" pressure zone.
15. The sum total of the pipe length changes in all benefit areas due to the reassigning of the "unknown" pressure zone should be the same as the total of pipe length which is assigned to "unknown" pressure zone in the District GIS.

OMWD - WATER MAIN PIPE LENGTHS BY BENEFIT AREA AND MATERIAL

AECOM

2010, Data from District GIS

Benefit Area A	< 2-inch	2-inch	4-inch	6-inch	8-inch	10-inch	12-inch	14-inch	16-inch	18-inch	20-inch	24-inch	27-inch	33-inch	36-inch	39-inch	42-inch	48-inch	21-inch	30-inch	Total
ACP	45.00	0.00	8,508.66	109,506.20	234,602.90	80,383.57	61,457.72	7,457.83	21,051.79	13,343.64	2,466.46	1,653.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**540,476.98**
CML	0.00	0.00	0.00	38.12	702.88	68.40	0.00	645.86	0.00	742.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**2,197.56**
CMLS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
CMLCS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
CMLWS	0.00	0.00	0.00	857.56	0.00	0.00	25.00	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**902.56**
COP	0.00	0.00	114.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**114.26**
DIP	0.00	0.00	0.00	50.00	236.65	315.38	357.28	100.00	788.80	0.00	0.00	569.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**2,417.96**
FP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
PVC	0.00	129.61	2,627.10	13,739.67	140,004.23	25,899.71	24,816.57	0.00	0.00	98.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**207,315.36**
SCC	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	90.00	154.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**344.59**
STL	0.00	90.00	282.89	2,143.26	4,725.65	585.27	20,935.58	311.70	12,211.75	690.43	0.00	2,554.78	172.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**44,703.97**
UNK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
TOTAL	**45.00**	**219.61**	**11,532.91**	**126,334.82**	**380,272.31**	**107,252.33**	**107,692.13**	**8,535.39**	**34,142.34**	**15,029.44**	**2,466.46**	**4,777.85**	**172.65**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**798,473.24**

Benefit Area B	< 2-inch	2-inch	4-inch	6-inch	8-inch	10-inch	12-inch	14-inch	16-inch	18-inch	20-inch	24-inch	27-inch	33-inch	36-inch	39-inch	42-inch	48-inch	21-inch	30-inch	Total
ACP	0.00	135.00	505.69	9,868.49	61,915.24	10,561.06	8,802.85	15.00	37.19	0.00	167.86	63.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**92,072.14**
CML	0.00	0.00	108.68	62.39	327.36	350.58	150.04	0.00	831.26	11,016.10	0.00	1,864.83	6,182.77	0.00	50.00	0.00	0.00	0.00	0.00	2,167.25	**23,111.24**
CMLS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
CMLCS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	157.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2,154.66	**2,311.90**
CMLWS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
COP	25.20	13.35	137.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**176.04**
DIP	0.00	0.00	0.00	0.00	0.00	0.00	477.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**477.06**
FP	0.00	0.00	0.00	0.00	3,749.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**3,749.89**
PVC	330.59	549.08	380.33	2,304.03	157,999.24	31,671.95	19,522.27	169.64	1,245.55	803.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.96	**214,994.18**
SCC	0.00	0.00	0.00	128.17	251.01	92.55	100.00	78.25	75.00	504.29	0.00	113.99	2,517.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**3,861.20**
STL	310.15	0.00	608.56	1,078.86	5,143.22	7,805.59	15,140.52	18,227.93	6,935.50	13,393.84	1,873.57	7,056.99	17,469.54	3,792.50	2,684.81	3,246.31	8,022.74	5,970.35	6,099.26	28,074.58	**152,934.82**
UNK	0.00	0.00	0.00	25.00	270.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**295.74**
TOTAL	**665.94**	**697.43**	**1,740.74**	**13,466.93**	**229,656.70**	**50,481.73**	**44,192.73**	**18,490.82**	**9,124.50**	**25,875.02**	**2,041.43**	**9,099.58**	**26,170.25**	**3,792.50**	**2,734.81**	**3,246.31**	**8,022.74**	**5,970.35**	**6,099.26**	**32,414.45**	**493,984.22**

Benefit Area C	< 2-inch	2-inch	4-inch	6-inch	8-inch	10-inch	12-inch	14-inch	16-inch	18-inch	20-inch	24-inch	27-inch	33-inch	36-inch	39-inch	42-inch	48-inch	21-inch	30-inch	Total
ACP	0.00	0.00	0.00	0.00	4,938.10	3,213.94	0.00	0.00	0.00	12.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**8,164.79**
CML	0.00	96.80	70.60	531.00	153.86	242.56	116.39	0.00	114.84	0.00	0.00	17.81	0.00	0.00	0.00	0.00	511.87	2,111.48	0.00	0.00	**3,967.22**
CMLS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
CMLCS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	95.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**95.14**
CMLWS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
COP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
DIP	0.00	0.00	0.00	0.00	1,756.88	4,270.12	4,926.51	0.00	39.98	4,075.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**15,068.86**
FP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
PVC	0.00	25.00	483.95	474.55	5,395.01	24,964.83	5,187.39	0.00	4,477.66	2,641.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**43,650.34**
SCC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
STL	84.20	0.00	38.16	5,632.20	0.00	6,321.18	480.28	25.00	786.54	40.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6,963.86	0.00	160.02	**20,531.44**
UNK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
TOTAL	**84.20**	**121.80**	**592.71**	**6,637.75**	**12,243.85**	**39,012.64**	**10,710.57**	**25.00**	**5,514.16**	**6,770.08**	**0.00**	**17.81**	**0.00**	**0.00**	**0.00**	**0.00**	**511.87**	**9,075.34**	**0.00**	**160.02**	**91,477.79**

OMWD - WATER MAIN PIPE LENGTHS BY BENEFIT AREA AND MATERIAL

AECOM

Benefit Area D	< 2-inch	2-inch	4-inch	6-inch	8-inch	10-inch	12-inch	14-inch	16-inch	18-inch	20-inch	24-inch	27-inch	33-inch	36-inch	39-inch	42-inch	48-inch	21-inch	30-inch	Total
ACP	0.00	0.00	816.14	28,442.74	72,180.40	16,098.31	39,957.23	12,520.60	5,102.97	2,756.42	646.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**178,520.88**
CML	101.36	15.02	116.51	471.82	718.85	251.68	694.65	451.08	1,324.05	7,701.67	0.00	369.86	976.41	0.00	9,494.11	3,613.56	0.00	0.00	0.00	17.64	**26,318.30**
CMLS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.69	0.00	51.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**64.45**
CMLCS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
CMLWS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
COP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
DIP	0.00	0.00	0.00	166.23	275.51	0.00	104.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**546.57**
FP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
PVC	10.00	201.74	1,254.61	3,836.17	128,655.79	46,146.81	15,723.88	9,389.79	7,367.64	0.00	0.00	31.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**212,617.45**
SCC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	682.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**682.30**
STL	20.00	80.00	303.49	2,323.08	4,811.00	3,018.02	11,393.17	5,729.80	1,206.54	9,633.16	0.00	20,832.40	2,819.16	0.00	203.64	84.75	0.00	0.00	0.00	0.00	**62,458.22**
UNK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
TOTAL	**131.36**	**296.77**	**2,490.75**	**35,240.03**	**206,641.55**	**65,514.82**	**67,873.76**	**28,103.97**	**15,001.21**	**20,143.01**	**646.06**	**21,233.29**	**4,477.88**	**0.00**	**9,697.76**	**3,698.31**	**0.00**	**0.00**	**0.00**	**17.64**	**481,208.16**
Benefit Area E	**< 2-inch**	**2-inch**	**4-inch**	**6-inch**	**8-inch**	**10-inch**	**12-inch**	**14-inch**	**16-inch**	**18-inch**	**20-inch**	**24-inch**	**27-inch**	**33-inch**	**36-inch**	**39-inch**	**42-inch**	**48-inch**	**21-inch**	**30-inch**	**Total**
ACP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
CML	0.00	0.00	0.00	674.37	98.51	645.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1,418.30**
CMLS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
CMLCS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
CMLWS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
COP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
DIP	0.00	0.00	0.00	0.00	152.99	227.72	0.00	0.00	0.00	0.00	38.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**419.37**
FP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
PVC	0.00	0.00	825.04	1,551.43	165,845.58	58,783.17	15,841.50	5,224.66	7,696.87	2,715.17	8,382.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**266,866.19**
SCC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
STL	0.00	0.00	0.00	0.00	0.00	0.00	120.00	0.00	420.36	2,680.09	4,651.41	3,064.96	0.00	578.65	0.00	0.00	0.00	0.00	0.00	0.00	**11,515.49**
UNK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
TOTAL	**0.00**	**0.00**	**825.04**	**2,225.80**	**166,097.08**	**59,656.32**	**15,961.50**	**5,224.66**	**8,117.23**	**5,395.26**	**13,072.84**	**3,064.96**	**0.00**	**578.65**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**280,219.35**

Appendix D – Status of 2006 Master Plan Capital Projects

Appendix D – Status of 2006 Master Plan Capital Projects

The following table provides the status of the capital projects that were identified in the 2006 Master Plan[2]. It covers the potable and recycled water and wastewater systems and includes capital projects and rehabilitation/replacement/betterment projects. Many of the projects have been completed or are scheduled in the current 10-year capital spending plan.

Potable Water System Capital Projects

Project Name	Begin Implementation	Cost	2010 Status
Cielo Pump Station (Phase II)	04/05	$64,000	Completed
Berk Reservoir	04/05	$4,981,000	Completed
Golem Reservoir to 4S-II Reservoir Connection Pipeline	04/05	$840,000	Development driven and funded. Constructed beyond 2016
Loop Pipeline at SDCWA 01 Connection	04/05	$1,061,000	In current 10-year CSP FY 10/11
WTP Post Chlorination Pressurized Clear Well	04/05	1,500,000	Replaced with ammoniation station, completed
Automated Meter Reading Project	04/07	$1,176,000	In current 10-year CSP FY10/11
Connemara Pump Station	05/06	$1,965,000	Completed
Hodges Reservoir	05/06	$3,216,000	Development driven and funded. Constructed beyond 2020
Golem/ 4G Booster Pump Station	05/06	$1,214,000	Development driven and funded. Constructed beyond 2020
4S-II Reservoir	05/06	$8,760,000	Completed
Dedicated inflow PL to 4S-I Tank	05-06	$3,875,000	Completed
District Facility Expansion	09/10	$4,875,000	In progress
NE I Reservoir	Beyond 2015	$4,501,000	Development driven and funded. Constructed beyond 2020
NE II Reservoir	Beyond 2015	$3,106,000	Development driven and funded. Constructed beyond 2020
WTP Pretreatment Facility Upgrade	06/08	$2,000,000	In current 10-year CSP FY 10-13, project has changed, estimates revised
OWTP Expansion	08/09	$25,600,000	Deleted, replaced with Unit AA pipeline scheduled for FY10-11

Recycled Water System Capital Projects

Project Name	Begin Implementation	Cost	2010 Status
NW Quadrant Implementation	04-06	$3,010,000	Completed, possible future expansion

Wastewater System Capital Projects

Project Name	Begin Implementation	Cost (2006 $)	2010 Status
4S WRF – Operation Building Expansion	05/06	$920,000	In progress
4S Ranch WRP Odor Control Modifications	08/09	$1,400,000	Odor issue resolved, project deleted
Emergency Wet Weather Storage Pond	2010	$2,500,000	In current 10-year CSP scheduled for 2011 - 2015

Water System Rehabilitation/Replacement/Betterment Projects

Project Name	Begin Implementation	Cost (2006 $)	2010 Status
Manchester Aveneu (P/L 14 A/C) Replacement of 12-inch Pipeline	04/05	$896,000	Completed
Fortuna Ranch Road Pipeline (P/L 16) Replacement	04/ 06	$4,445,000	Completed
Gaty I Decommissioning	05/06	$5,258,000	Reduce to $1,000,000. Possibly 2015/16
Encinitas Blvd. Pipeline (P/L 26) Replacement/Rehabilitation	05/ 07	$3,796,000	In current 10-year CSP FY 2010/13
Miller Reservoir Interior/Exterior Recoating	09/10	$725,000	Replaced by outsourced annual maintenance agreement
9th Street (P/L 11) Replacement of Existing 6-inch (Ext 8) Pipeline	12/13	$228,000	In current 10-year CSP FY 2015/16
Meter Replacement Program	Annual	$5,500,000	In current 10-year CSP FY 10 – 20
Membrane Replacement	Annual	$9,792,000	In current 10-year CSP FY 10 – 20
System Wide Rehabilitation Program	Annual	N/A	In current 10-year CSP FY 11 – 20
El Camino Real (P/L 19 A&B) Replacement of 12-inch Pipeline	Beyond 2015	$2.373.000	In current 10-year CSP FY 16 – 18
Rancho Santa Fe Road (P/L 17) Replacement	Beyond 2015	$2,324,000	In current 10-year CSP FY 16 – 18
Lone Jack Road Pipeline (P/L 17) Replacement	Beyond 2015	$940,000	In current 10-year CSP FY 17/18

Project Name	Begin Implementation	Cost (2006 $)	2010 Status
12-inch line to Golem Reservoir	Beyond 2015	$2,475,000	Project cancelled
Main 14 – Main 24 Connection Point to Bridges	Beyond 2015	$3,073,000	Development Driven. Constructed beyond 2020
Fairbanks Ranch Circa del Sur Line	Beyond 2015	$1,460,000	Completed
Gaty Line	Beyond 2015	$1,211,000	Future project beyond 2020
CWA #1 to Gaty Tanks	Beyond 2015	$2,545,000	Now named the Elfin Forest Loop Pipeline. Scheduled for 2011/12

Cathodic System Rehabilitation/Replacement/Betterment Projects

Project Name	Begin Implementation	Cost (2006 $)	2010 Status
Elfin Forest Rd – Rectifiers 19 to 22 Replacement	04-05	$250,000	Partially completed, in progress
Transmission System Anode Replacement Program	Annually	$2,724,000	In current 10-year CSP annual
Test Station Maintenance Program	Annually	$2,500,000	In current 10-year CSP annual
ICCP System Maintenance Program	Annually	$650,000	In current 10-year CSP FY 17/19
Individual Connection Zinc Anode Replacement	Annually	$1,040,000	In current 10-year CSP annual

Wastewater System Rehabilitation/Replacement/Betterment Projects

Project Name	Begin Implementation	Cost (2006 $)	2010 Status
4S WRF – Replacement of 2 Aerators in Oxidation Ditch	04-05	$60,000	Project cancelled
Plant “A” Miscellaneous Operational and Maintenance Improvements	04-05	$475,000	Completed